

NETWORK WORLD

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

NETWORK MGMT.

HP, SunConnect aim to open up mgmt. databases

BY JIM DUFFY

Hewlett-Packard Co. and Sun Microsystems, Inc.'s SunConnect business unit will soon enhance their respective net management platforms with an API that facilitates the gathering of information from databases associated with other net management systems and applications.

The "database independent" call-level interfaces (CLI) under development separately by HP and Sun for the HP OpenView and SunNet Manager systems will also free users to implement the database of their choice with those platforms. Ultimately, the idea is to let users create a central repository for management data by allowing OpenView and SunNet Manager to query the multivendor SQL databases of other management tools and applications.

Each vendor plans to include the application program interface as part of their application development tool kits.

See Databases, page 109

Unimpeded access

- HP and Sun call-level interfaces will:
 - Allow OpenView and SunNet Manager applications to easily access data on multivendor databases.
 - Allow users to deploy the databases of their choice for OpenView and SunNet Manager.
 - Help group multiple management databases into a logical data repository.

SOURCE: HEWLETT-PACKARD CO., FORT COLLINS, COLO., AND SUN MICROSYSTEMS, INC., MOUNTAIN VIEW, CALIF.

Shuttle to launch satellite that will usher in new era

BY ELLEN MESSMER

Kennedy Space Center, Fla.

This week's space shuttle launch carrying aloft the National Aeronautics and Space Administration's Advanced Communications Technology Satellite (ACTS) will herald in a new era of high-bandwidth, flexible satellite services.

Dozens of organizations, including American Express Co., Huntington National Bank and the Mayo Foundation, have lined up to test applications using ACTS innovations, including

data rates 20 times that offered by conventional satellites.

Other advances include satellite-based processors that will, in theory, eliminate the need for satellite hubs. Use of frequencies in the Ka-band will allow for the development of a new type of antenna called the Ultra-Small Satellite Terminal (USAT), only 1.2 meters across.

As a prototype for the next-generation satellite, ACTS will remain a test bed for at least two years.

Built by Martin Marietta Aerospace, the satel-



lite can support as many as three 960M bit/sec channels, which can be segmented into channels ranging in speed from sub-T-1 rates to 622M

See Satellite, page 109

GOSIP users revolt

Gov't to review GOSIP, also consider TCP/IP support.

BY ELLEN MESSMER

Washington, D.C.

In what could be a death blow to OSI, the National Institute of Standards and Technology (NIST) last week said it has agreed to review the idea of including TCP/IP products in the GOSIP federal purchasing mandate.

The Department of Energy spearheaded the uprising against the Government Open Systems Interconnection Profile by prompting the Federal Networking Council (FNC), a group of federal government agencies that gives input on technology questions, to vote in favor of launching a broad review of GOSIP.

The Energy Department's proposal to review GOSIP, approved by the FNC, basically asked the government to determine whether OSI or the Transmission Control Protocol/Internet Protocol suite can satisfy the government's short-

and long-term networking requirements.

"The goal of the review is to reexamine the acceptance of the TCP/IP suite so that it may be included in GOSIP," said Bill Aiken, network research program director at the Energy Department who was instrumental in preparing the department's call for the GOSIP review. "We consider them both open systems."

In its response to the FNC, NIST put forward a timetable for action, agreeing to convene a nine-member panel drawn from two user groups, the FNC and the Federal Information Resource Management Policy Council, by mid-September, said Tassos Nakassis,



acting division chief of the computer and systems network division at NIST.

The panel's goal is to issue a conclusive report by December — a goal NIST officials admit is optimistic.

In the meantime, GOSIP Version 3, scheduled for release in August, is now on hold. GOSIP 3 was to include such OSI features as the Intermediate System-to-Intermediate System (IS-IS) routing protocol, X.500, Transaction Processing, Remote Database Access and the Information Retrieval protocol.

The Energy Department has experienced difficulties with OSI, ranging from lack of available products for high-end research computers to installation problems. "We need to reexamine the decision about OSI," Aiken said.

See GOSIP, page 109

Carrier billing up to snuff, users say

BY DANIEL BRIERE
AND CHRISTOPHER FINN

Framingham, Mass.

According to a *Network World/TeleChoice, Inc.* user survey, local and long-distance carriers are making major headway in their quest to meet end-user requirements for billing and management reporting.

Survey findings lend credence to claims by carriers that new billing programs and services are a hit with users. Of the 100 *Network World* readers surveyed, 81% said they think their carriers are adequately focused on providing quality billing and reporting, while only 16% said their providers are not working to solve their problems.

For 18% of those surveyed, billing and reporting remains the key (4%) or a major factor (14%) in choosing a carrier. Of those users, 61% tap accuracy of reporting as their primary concern in regard to billing. Enhanced applications support was listed by 22% of respondents.

However, 58% of end users say billing is now a secondary factor in their purchase decision, down considerably from similar industry surveys conducted in the past. This is another indication that billing has improved, making it less of an issue for customers.

NETWORK WORLD
SURVEY
TELECHOICE

See Billing, page 110

Loral writes script for integrated net management

BY JIM DUFFY

San Jose, Calif.

Got a problem melding those myriad management systems into a cohesive whole? Give Loral Corp. a call.

The military electronics giant has figured out a way to link element managers, enterprise managers and managers of managers into an intuitive, automated system that can kick off a series of adjunct processes when piqued by an alarm.

Loral's Western Development Laboratories first developed the system to manage its own corporatewide network. And now it will do the same for users as part of a systems integration service offering.

Loral recently landed its first customer for the network management service, a large company located on the East Coast that awarded the firm a \$4.2 million contract to tie its management platforms together.

However, Loral officials would not identify the customer but said it has the world's seventh-largest private network linking 91 sites.

How does Loral do it? With homespun Unix C shell script files.

"We mostly use script files to call from one [management] application to another and pass the appropriate [device] parameters" from one management system to another, said Eric Kuhn,

See Loral, page 109

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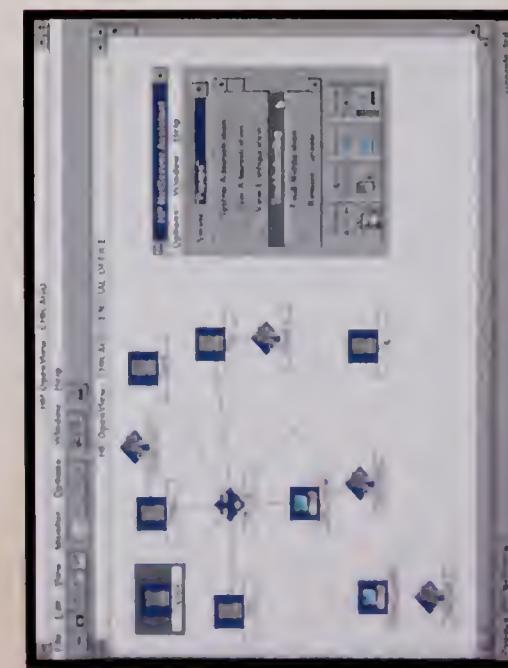
HP NetServer LM

- 60-MHz Intel Pentium® processor, 33-MHz Intel 486 DX and 66-MHz Intel 486 DX2 processors
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HP NetServer LE

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- 256-KB external cache
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- 5 EISA bus-master I/O slots
- Integrated Fast SCSI-2, IDE and video controllers
- HP NetServer Assistant software available as an option
- 3-year on-site, next-business-day limited warranty
- Tested and certified on major network operating systems



HP NetServer Assistant



* MSRP for HP NetServer LM Model 1000. ** MSRP for HP NetServer LE Model 1000 including 4-MB RAM, 128-MB standard RAM, 384-MB maximum memory, and the Intel Inside logo are trademarks of Intel Corporation.

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Problem identification and resolution tools including diagnostics, configuration planning and technical information via a CD-ROM-based library.

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Open architecture facilitates adding specialized third-party or HP management utilities.

HP NetServer LM

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If managing
your server
eats up all
your time,
you need an
assistant.

Briefs

NCR to join ATM crowd. NCR Corp. in two weeks is expected to announce plans to add an Asynchronous Transfer Mode (ATM) interface to its SmartHUB XE and XL line of hubs as the first phase of an ATM strategy that leverages the wide-area networking expertise of parent AT&T. Analysts expect NCR will ultimately add an ATM switching fabric to the SmartHUB line and unveil an ATM backbone switch that links ATM work groups to wide-area ATM networks. NCR confirmed that it will discuss its ATM strategy on Aug. 9 but declined further comment.

NT server gets out early. The shipping schedule for Microsoft Corp.'s Windows NT Advanced Server continues to move up. Microsoft had said the Advanced Server would ship about 30 days after the desktop version of Windows NT, but the development team has completed its work early and the two components will now ship simultaneously, the company said. Advanced Server adds centralized network management, single network logon, fault tolerance, remote access and other services to the Windows NT network-capable operating system. Both are expected to be approved for manufacturing this week and begin shipping by mid-August.

SS7 goes wireless. BellSouth Telecommunications, Inc., BellSouth Mobility, Inc. and McCaw Cellular Communications last week said they successfully completed a test of Signalling System 7 interconnection between wireline and wireless carriers' switches that will give cellular customers access to network services such as Caller ID.

DEC, Tandem put on Tuxedo. Digital Equipment Corp. last week announced support for Unix System Laboratories, Inc.'s Tuxedo System transaction processing monitor on DEC Alpha AXP computers. Likewise, Tandem Computers, Inc. announced that it will market the system as NonStop Tuxedo and support it across its computer lines, including its new Himalaya systems. The Tuxedo System is designed to help users build client/server and distributed applications.

Northern Telecom in red, layoffs to come. Northern Telecom, Inc. last week announced a second-quarter loss of \$1.03 billion and predicted unspecified losses for the year. In the second quarter, the company suffered a \$940 million restructuring charge, which included \$282 million to cut 5,200 employees from its staff of 60,000 in coming months. Northern Telecom's restructuring plans also call for shifting operations between plants and writing off assets.

Budding up on ATM. Network Equipment Technologies, Inc. and Ericsson Business Networks last week signed a cooperative agreement to jointly fund and develop a wide-area Asynchronous Transfer Mode (ATM) switch. In a related matter, StrataCom, Inc. last week announced a licensing agreement with chip maker PMC-Sierra, whereby PMC will build and distribute two ATM chips that incorporate cell technology developed and patented by StrataCom.

Big Blue board is three shy. To make way for "younger, more technology-oriented executives," two veteran IBM directors are expected to resign from the firm's board of directors this week, according to industry sources. Richard Munro, former co-chief executive officer of Time-Warner, Inc. and Stephen Bechtel, chairman emeritus of Bechtel Group, Inc. are expected to relinquish their posts. Coupled with IBM Vice Chairman Jack Kuehler's retirement in August, that will leave three open positions on Big Blue's 17-member board.

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Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Susan Collins at (800) 622-1108, via fax at (508) 820-3467 or via Internet at scollins@world.std.com.

Where can users find out about undocumented NetWare parameters?

David Eguchi, Honolulu

Ronald Nutter, escalation manager of 900 Support, a 24-hour, seven-day-a-week Novell, Inc. technical support company in Lake Oswego, Ore., replies:

In some cases, new command-line parameters are documented with the driver as Novell ships it out.

Most of the time, the information can be found on NETWIRE on CompuServe or in Novell's Network Support Encyclopedia Professional (NSEPRO) Edition.

NSEPRO costs \$1,300 a year, which may seem expensive, but if you are supporting several networks, it can be worth its weight in gold since Novell will send monthly all the downloadable drivers and patched drivers on CDROM.

I'm looking for some information on the Apple Computer, Inc. Workgroup Server 60, 80 and 95. My company currently uses a workstation as the file server for our 25-station AppleTalk network, but, eventually, we plan to move to a dedicated server environment.

Mary Stanhope, Boston

Joel Snyder, senior partner with Opus One, a Tucson, Ariz., consultancy specializing in networks and information technology, replies:

The Apple Workgroup Servers are high-performance file-serving systems Apple recently introduced to meet user demand for faster file servers. Workgroup Servers offer more internal storage options and cache memory than standard Macintoshes but are also higher priced.

Depending on configuration, the Apple Workgroup Server 60 ranges in price from \$2,949 to \$3,899; the Apple Workgroup Server 80 ranges from \$5,489 to \$9,049 and the Apple Workgroup Server 95 ranges from \$6,089 to \$11,429, according to Apple.

While the Workgroup Servers are interesting, See Help desk, page 96

CONTENTS

NEWS

3 Hypercom switch takes on SNA task.

3 AT&T to raise rates 3.9%; others may follow.

3 AT&T shuffles executive suite to globalize market.

5 Pledges of cooperation point to interoperability.

6 Tandem maps out messaging products.

7 IBM prepping new versions of LAN Server.

7 NetFRAME server to support multiple OSes.

7 CLI brings video to Ethernet.

9 Hughes to roll out Windows-based hub mgmt. app.

9 Vendors vie for piece of client/server accounting mart.

ENTERPRISE INTERNETS

14 DEC, Cisco map different routes to DECnet/OSI.

14 Memorex Telex expands its enterprise role.

14 Micom, Teleglobe target remote sites.

15 Unison-Tym labs' Maestro brings Unix on schedule.

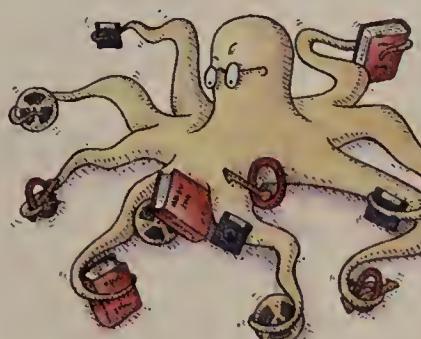
15 CKS expands SNA mainframe security.

LOCAL NETWORKS

18 Apple shuffle raises some enterprise mart concerns.

18 Microtest tool to link CDROMs to NetWare LANs.

18 Alantec enhances switching hub with mgmt. capabilities.



26 California considers local toll competition.

26 MCI exec maps out data directions.

29 Elsevier pioneers age of electronic book distribution.

83 API to give mobile devices access to positioning service.

CLIENT/SERVER APPLICATIONS

86 NetWare Global MHS users share their experiences.

86 Windows version of Notes taps key niche.

86 Farallon gives Adobe Acrobat run for money.

87 Sybase to unveil new object-based tools.

FEATURES

89 Opinions/Letters

93 New version of SNMP protocol suite sports services ripe for enterprise nets.

98 LAN Manager probe reveals security services may leave some users wanting more.

100 Action Center

106 Networking Marketplace

108 Networking Careers

AT&T to raise rates 3.9%; others may follow

BY BILL BURCH

Washington, D.C.

Given FCC approval, AT&T plans to raise its business rates 3.9% starting Aug. 1, and analysts say MCI Communications Corp. and Sprint Corp. will likely follow suit.

The broad-based increase will mean most rates will increase close to 4%, with only a few services rising by less. The increase would apply to domestic and international long-distance calls, as well as 800 and data communications services. The charges will be spread broadly across a customer's bill, with increases in network access charges and calling rates. Some installation charges and monthly fees will also go up (see graphic, this page).

The only services AT&T held out for smaller increases were 800 directory assistance, which will go up 2.4%, and calling card basic rates and per-minute charges, which will rise 3.0%. AT&T's largest increases will come in advanced 800/900-service features. For example, the price of alternate routing for an 800 line will rise 25%.

SLOWLY INFLATING

During the past five years, AT&T has cut business rates by an average of more than 6%, while inflation has increased 19%. But the company now says it has to raise rates to cover inflation and the increased cost of doing business.

In addition, AT&T says it needs the money to cover network investment expenses, particularly the \$100 million expense of preparing for 800-number portability.

Daniel Reingold, Merrill Lynch & Co., Inc. analyst, said the across-the-board AT&T rate increase was noteworthy because it breaks a pattern of smaller increases for individual services. Reingold attributed the increase to recent industry revenues falling short of what AT&T had expected. He predicted that the increases would bring the company \$500 million annually in new revenue, with \$300 million of that coming from business users.

Expect MCI and other carriers to follow AT&T's lead, he warned. Although MCI may choose to hide the increase in a series of smaller announcements, AT&T's rivals have been following its pricing lead for years, he added.

Jacquelyn Popp, an analyst at Duff & Phelps/MCM Investment Research Co. in Chicago, also thinks MCI and Sprint will follow AT&T's lead but only to the extent that the two companies' rates are below those of AT&T. By following that strategy, MCI and Sprint would be able to grow market share while maintaining profit margins. For AT&T, the move could be a signal that the company is now confident of its competitive position and does not have to fight it out on price, Popp said.

RAISING QUESTIONS

Sprint said it was studying the filings but had not yet made a decision on whether to raise rates. MCI also said it had the filings under study but had not made any decisions about possible increases.

Among users, Data Communications Manager Bill Fink with Storage Technology Corp. in Louisville, Colo., who relies on AT&T DS0s and T-1s, is facing a 3.9% increase in the cost of his private lines.

Fink said he would prefer that AT&T follow the computer industry pattern of increasing performance and decreasing costs.

Len Evenchik, director of communications for the commonwealth of Massachusetts, said inflation was not an adequate rationale for AT&T's price hike. Like Fink, Evenchik drew an analogy to the personal computer market, where features and speed continually improve while prices continually drop.

"There's two different markets — the folks who make cars, and their prices go up every year, and the folks who make computers, [and] their prices go down every year," Evenchik said. "AT&T should be in the second market." □

SOURCE: AT&T, BASKING RIDGE, N.J.

Computer market, where features and speed continually improve while prices continually drop.

"There's two different markets — the folks who make cars, and their prices go up every year, and the folks who make computers, [and] their prices go down every year," Evenchik said. "AT&T should be in the second market." □

AT&T shuffles executive suite to quickly globalize market

BY BILL BURCH

New York

AT&T last week announced a series of executive changes, effective Aug. 1, that are intended to position the company for global growth and emerging markets.

"The changes we are announcing today are aimed at creating a more collaborative style of management," said AT&T Chairman Robert Allen. "Our intent is to build on our recent successes in international markets to globalize the business more quickly."

Allen said the changes will also help the company gear up for the convergence of communications, consumer electronics, entertainment and computers.

From within the company, Allen named Victor Pelson, William Marx Jr. and Jerre Stead to serve as executive vice presidents. Their role will be to spearhead Allen's goal of generating half of the company's revenue overseas.

Pelson, 56, will lead the company's global opera-

tions team and take a seat on AT&T's board of directors. He is currently in charge of communications services. Currently head of network services, Marx, 54, will be chief executive officer of network systems. He will take charge of the company's worldwide purchasing operations and global manufacturing planning.

Together, Pelson and Marx are to take the lead in speeding up AT&T globalization. They will integrate the individual strategies of AT&T's various businesses and set up regional and countrywide operations to respond to local markets.

As the third executive vice president, Stead will work with Pelson and Marx to use NCR Corp.'s worldwide presence to help speed AT&T's expansion. Stead, 50, became NCR's CEO this year after serving as president of AT&T global business communications systems.

Robert Kavner, 50, will become a fourth executive vice president and the CEO of multimedia for the car-

See AT&T, page 7

Hypercom switch takes on SNA task

Lets users natively send SNA over internet.

BY MAUREEN MOLLOY

Phoenix

In a departure from the strategies outlined by most of the leading router vendors for integrating IBM SNA traffic into internet backbones, Hypercom, Inc. is prepping a device that will let users support SNA in native mode.

The company will announce at INTEROP 93 next month its Integrated Enterprise Network (IEN), a hybrid router/circuit switch that supports local-area network traffic and Systems Network Architecture sessions over a single enterprise-wide network.

The IEN architecture allows users to build an internet backbone that supports both time-division multiplexing (TDM) and packet switching. It uses a mixture of static and dynamic routes to enable users to reserve a portion of the wide-area bandwidth for SNA traffic while using the variable routing capability for LAN-based data.

Tom Nolle, president of CIMI Corp., a Voorhees, N.J., consultancy, said Hypercom's SNA lineage has let the vendor design a product that will fit SNA's requirements rather than trying to shoehorn SNA into a LAN internet design.

The IEN has a parallel processing architecture and comes in three-, six-, 16- and 32-port versions, all of which support any combination of SNA, LAN and wide-area net ports. Each interface card has its own dedicated processor. The device has a packet bus that runs at 344M bit/sec and a TDM bus supporting time slots ranging from 8K to 2M bit/sec per port, for a total TDM capacity of 132M bit/sec, and has an aggregate packet forwarding rate of 200,000 packet/sec for 64-byte packets.

In addition to ports that support SNA/Synchronous Data Link Control and Binary Synchronous Communications traffic, the IEN can be equipped with both Ethernet and token-ring router modules that support the routing of Transmission Control Protocol/Internet Protocol, DECnet, Novell, Inc. Internetwork Packet Exchange (IPX), Xerox Network Systems and AppleTalk traffic at wire speed.

It will also support all standard bridging algorithms and the Open Shortest Path First interrouter protocol.

Incoming data travels over one of two buses to a transport processor that appends a transport header to the packet (see graphic, this page). With SNA data, the header contains such information as source and destination addresses, SNA physical unit/logical

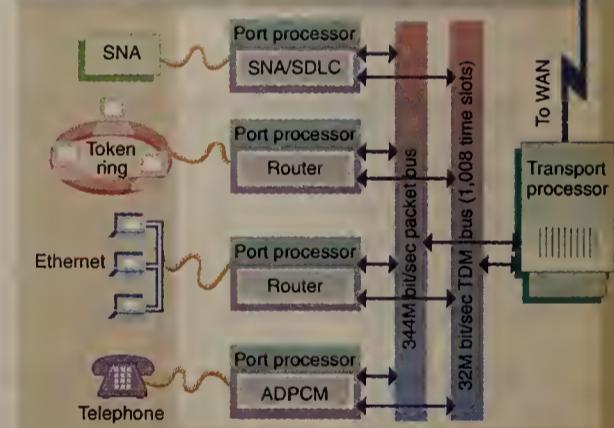
unit addresses, sequence number, host identification and flags that indicate priority, data compression, encryption, route speed and segmentation.

The transport processor uses both static and dynamic routing. With static routing, which is usually reserved for SNA traffic, predetermined paths are used. Dynamic routing allows for the discovery of additional paths if there is congestion or link failures, and is suitable for internetworked LAN traffic.

On the wide area, the IEN supports X.25, frame relay and T-1 ports and an integrated 56K bit/sec data service unit and 14.4K bit/sec modem, plus Integrated Services Digital Network and dial backup.

The most common approaches touted by router vendors for handling SNA on their respective gear include such tricks as converting SDLC packets into a token-ring Logical Link Control 2 (LLC2) format or encapsulating SNA packets in a TCP/IP envelope for transport across an internet. The IEN does not try to mold SNA into TCP/IP form, said Paul Wickre, Hypercom's director of marketing. "Features such as local

Hypercom's Integrated Enterprise Network



The IEN architecture

ADPCM = Adaptive differential pulse code modulation

TDM = Time-division multiplexing

GRAPHIC BY TERRI MITCHELL

SOURCE: HYPERCOM, INC., PHOENIX

acknowledgment [of LLC2 timers] or SDLC poll spoofing are of some use, but neither changes the fact that SNA is simply a nonroutable protocol or that SNA loses its personality once it enters the TCP/IP packet," he said.

The IEN will also let SNA users migrate to an internet without Network Control Protocol and VTAM configuration changes via Virtual Mapped SNA, which decouples the logical network from the physical net. SNA addressing can be mapped out to let several devices appear multidropped on a single SNA host line while actually being located in different areas on the network.

The 32-slot 6000 model costs from \$20,000 to \$32,500; the 16-slot 5000, \$17,500 to \$28,500; the six-slot 3000, between \$7,500 and \$13,700; and the three-slot 1000, \$2,000 to \$3,000. All are available now.

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Pledges of cooperation point to interoperability

BY FREDERIC PAUL

Denver

With a stream of new product announcements and the standards process progressing, wireless local-area networks appear to be shaping up as a mainstream option for network managers.

NCR Corp. last week announced it has signed a joint marketing and development agreement to create and sell drivers that will enable its WaveLAN system to work with Banyan Systems, Inc. VINES LANs. In recent weeks, vendors including Windata, Inc. and Proxim, Inc. have likewise introduced new

wireless LAN products, partnerships or announced distribution deals (NW, June 28).

More important in the long run, the IEEE 802.11 committee has taken a number of concrete and symbolic steps toward merging the various proprietary wireless LAN approaches.

Such a merger is critical if wireless LANs are to fulfill their potential, said Ken Dulaney, a service director at Gartner Group, Inc. in Santa Clara, Calif. Wireless LANs should ideally let users carry their notebook or handheld computers into any office — including customers', suppliers', or branch offices of a single company — and log on to the network.

In pursuit of that freedom, representatives from all the major players in the wireless LAN market used the recent 802.11 committee meeting here to express their intention to compromise on standards. In a straw poll, all the vendors agreed to follow the standards set.

"In general, things are beginning to move a lot faster," said Rifaat Dayem, who runs Alameda Research in Cupertino, Calif.

Others were less optimistic. "We didn't close any issues," said Phil Belanger, director of marketing for wireless products at Xircom, Inc. in Calabasas, Calif. "That doesn't sound like progress to me."

In addition to agreeing to agree, the 802.11 committee adopted frequency-hopping spread-spectrum technology based on a Gaussian frequency-shift keying modulation (GFSK) scheme, which defines how data is encoded in a wireless LAN transmission. GFSK is core physical-layer technology, which — as implemented by the committee — will operate in the 2.4-GHz to 2.5-GHz spectrum at 1M bit/sec.

The GFSK scheme was proposed by Motorola and supported by such companies as Apple Computer, Inc., GEC Plessey, IBM, National Semiconductor Corp. and Xircom.

Belanger said the GFSK approach was "not perfect" but described it as a "good, practical" beginning. But David King, vice president of marketing at Proxim, Inc., in Mountain View, Calif., said the GFSK scheme "still leaves a lot of room for interpretation."

Apple also proposed a physical-layer implementation designed to work even under crowded and noisy conditions, said Frank Prabel, marketing manager for wireless technologies at the Apple Business Systems Division. The tradeoff for that resistance to interference is a reduction in data throughput from the 802.11's stated goal of 1M bit/sec to a 625K bit/sec raw data rate and about a 270K bit/sec effective data rate.

Finally, the committee cut off submissions of any new media access control layer proposals to concentrate on those that IBM, NCR, Spectrix Corp., Xircom and others have made.

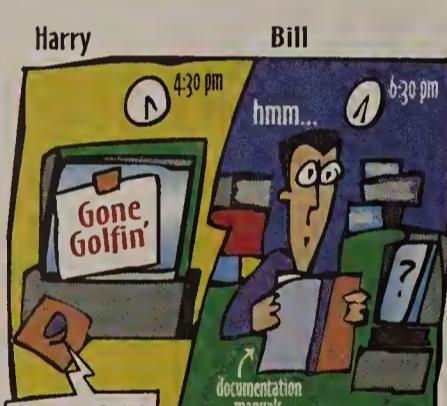
Dayem predicted the 802.11 committee would combine aspects of the top three or four proposals and come up with a draft specification by its November meeting. □



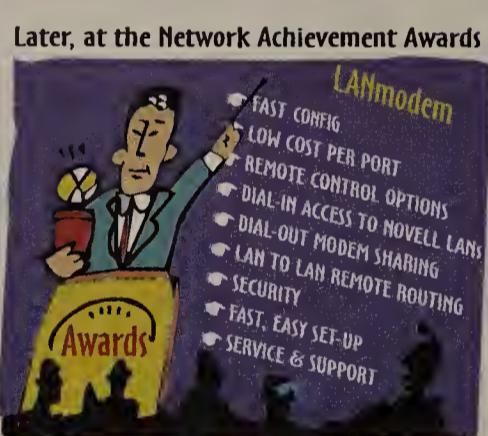
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Circle Reader Service #37

CORRECTIONS

Due to incorrect information supplied by Apple Computer, Inc., the story and graphic on page 18 indicate that Apple's Enterprise Technologies operating unit will be responsible for Apple Virtually Integrated Technical Architecture Lifecycle (VITAL). The Open Systems Software group will handle VITAL.

The shipping date for PictureTel Corp.'s new desktop videoconferencing system was incorrect in the story on page 1 last week. The PictureTel LivePCS 100 will ship in the fourth quarter of this year.

The story "IBM enhances line of connectivity products" (July 5, page 20) incorrectly stated the price of IBM's OfficeVision/400. For an unspecified limited time, the product is priced at \$222.50 for the first license and \$175 for additional licenses — a 50% reduction from the regular price.

Tandem maps out messaging products

BY BOB BROWN

Cupertino, Calif.

Tandem Computers, Inc. last week mapped out an enterprise messaging architecture, briefing users on plans for a fault-tolerant messaging switch and other products for building E-mail backbones.

Tandem has succeeded at selling messaging products to value-added network carriers to date, but hopes to attract corporate users with new fault-tolerant messaging systems. As enterprise-wide electronic mail networks are being used to support critical applications — especially to suppliers and customers — fault tolerance is emerging as a common user requirement.

Tandem's new messaging products will leverage the company's new NonStop Himalaya line of Reduced Instruction Set Computing-based computers, which were announced last week. The fault-tolerant computers mark Tandem's effort to give users of its proprietary Guardian operating system a migration path to Unix computers, since the new machines will run either operating system.

Tandem officials declined to comment, but industry observers familiar with the new products said Tandem is headed in the right direction.

"The support for products running on Himalaya will bring Tandem down market even as the company moves forward with new technologies, such as X.435 and X.500," said Victor Wheatman, program director for electronic commerce strategies at the Santa Clara, Calif., office of market research firm Gartner Group, Inc.

Tandem briefed users on a three-level messaging architecture. The top layer, the Inter-enterprise Systems Level, consists of servers that provide managed message transport between departments and external systems, such as those of public E-mail nets and trading partners. The Establishment Level features servers tying together host- and local-area net-based E-mail systems, possibly within a department or across departments. And the Desktop/Client Level consists of actual E-mail end users.

The heart of Tandem's new messaging product line is an E-mail switch dubbed the Message Integrator, which is currently shrouded in mystery. Tandem is negotiating with a vendor that will supply software for the Message Integrator, but it has yet to make any formal announcement.

The product will be positioned against message switches such as SoftSwitch, Inc.'s Enterprise Mail Exchange, which runs on a Data General Corp. AViON system, a near-fault tolerant computer.

Message Integrator software will run on the Himalaya line equipped with the Guardian operating system and will be positioned to run as either a departmental or enterprise switch, tying together multiple departments.

The Message Integrator will synchronize various E-mail system directories, and translate between office system document formats and between multinational character sets in E-mail systems.

Initially, it will provide interoperability among several major E-mail packages: IBM's OfficeVision/VM and OfficeVision/400, Digital Equipment Corp.'s All-in-1, Hewlett-Packard Co.'s DeskManager, Microsoft Corp.'s Microsoft Mail and Lotus Development Corp.'s cc:Mail. Down the road, Message Handling Service-based E-mail systems will also be supported.

The Message Integrator will also provide integration between these systems and 1988 X.400 systems.

In line with this support, Tandem will announce Release 3.0 of its Open Systems

Interconnection/Message Handling System (MHS), a 1988 X.400 backbone product, and Version 2.0 of its OSI/Gateway Programmatic Interface, which is based on an X.400 Application Program Interface Association standard API to X.400 services.

Ron Sherman, X.400 project manager for US West Communications, said Tandem is headed in the right direction.

"I'm half excited," Sherman said. "I'd rather see them offering the messaging products on Unix" as opposed to just its proprietary Guardian operating system. US West is a user of Tandem Unix-based computers.

A key new feature of the OSI/MHS product will be support for X.435, which allows for the merger of electronic data interchange and E-mail over X.400 backbone nets. Tandem also plans to support RFC1006, which will enable X.400 and other OSI applications to run over Transmission Control Protocol/Internet Protocol nets.

Tandem also announced plans to support X.500, including Directory Server Agents and Directory User Agents. Further details were not available, except that products will be delivered next year.

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NetFRAME server to support multiple OSes

BY CARYN GILLOOLY

Milpitas, Calif.

NetFRAME Systems, Inc. is expected this week to bring out software for its line of superservers that will allow users to run multiple operating systems within the same machine.

The new software, called Concerto, will let customers dedicate separate processors within a single NetFRAME superserver to different tasks running under different operating systems. For example, customers will be able to use one processor to support a DOS-based file-and-print server, while two other processors handle independent Unix-based application servers.

To date, Concerto only supports NetWare and two flavors of Unix — Unix SVR4.2 and Univel's UnixWare. In the future, NetFRAME plans to add support for other oper-

ating systems, including OS/2 and Microsoft Corp.'s Windows NT.

"Our goal is to give [customers] the freedom to run whatever software application best meets their needs, regardless of the operating system," said Enzo Torresi, president and chief executive officer of NetFRAME, based here.

"By supporting multiple operating systems in a single superserver, Concerto allows companies to add [Intel Corp.] 486 or Pentium-based application processors in the NetFRAME server in order to run different applications under NetWare, Unix SVR4.2 or another [operating system]," Torresi added.

Concerto is message-passing software that lets processors send and receive messages from other processors within a Novell, Inc. NetWare environment, according to Jeff

Hudson, vice president of marketing for NetFRAME.

To take advantage of Concerto's multi-processing capabilities, users need at least one NetFRAME application processor board, which can be loaded into the company's existing superservers. Operating system, application and Concerto software all run on top of the boards, while the core NetWare operating system runs on the server's main system processor.

When the setup is complete, the user has a virtual local-area network within one box, where one processor acts as the primary NetWare file-and-print server, while the others act as independent application servers. The additional processors can also be dedicated to run individual NetWare Loadable Modules (NLM), as is possible today within a typical NetWare environment.

Concerto will be available in October for \$3,995 for two operating systems and \$4,995 for three or more operating systems. A four-processor entry-level NetFRAME superserver with 32M bytes of memory and two 550M-byte drives costs \$32,445.

©NetFRAME: (408) 944-0600.

VIDEOCONFERENCING

CLI brings video to Ethernet

BY ELLEN MESSMER

San Jose, Calif.

Compression Labs, Inc. (CLI) next week will announce versions of its Cameo line of desktop videoconferencing systems that support Ethernet and switched digital services.

The move will come less than a month after rival PictureTel Corp. moved to usher in standards-based desktop videoconferencing. CLI's announcement will broaden the options for users of Apple Computer, Inc. microcomputers so they can offer desktop videoconferencing across an enterprise.

At MacWorld Expo/Boston, CLI will unfold plans to ship Cameo versions this September that operate over Ethernet local-area nets and also support switched 56K bit/sec transmission services. But because videoconferencing over a LAN still presents fundamental technical problems, CLI will market the Cameo Ethernet product with several "buyer-beware" provisos warning against use in certain circumstances.

Videoconferencing systems have traditionally relied on circuit-switched telecommunications, not data packets, to deliver picture and sound. Lack of guaranteed packet delivery time on most LANs means videoconferencing's real-time networking requirement sometimes cannot be met.

While many Ethernet LANs can support videoconferencing without problems, CLI will caution users not to expect a perfect picture when the image has to travel across heavily congested LANs or multiple LANs connected with routers.

"With the performance question, we can't just go out and sell the product," said John Walsh, senior vice president of corporate planning and general manager of the Personal Multimedia Products Group at CLI. "When a LAN is loaded, the video



WALSH

breaks up. We concluded that we need caveats in it."

Like the earlier Cameo model, which uses Integrated Services Digital Network Basic Rate Interface, the new Ethernet and switched 56 Cameo products will come bundled with a video processor module and a camera module that plug into standard ports on the Macintosh IIIfx or Quadra running System 7 with Quicktime.

The Cameo switched 56 and Ethernet versions will cost about \$2,000, the same price as the ISDN product.

With the ISDN-based Cameo system, users also have to buy an ISDN card, which costs about \$1,700, and a digitizing display card, which typically runs \$300 to \$700, Walsh noted. If users opt for the switched 56 version, they will need a switched 56 card for the microcomputer and a data service unit, making the equipment costs comparable to an ISDN setup.

Since users on Ethernets already have LAN adapters, the cost of the Ethernet Cameo will be around \$2,000. "But again, [the Ethernet kit] will only work in limited circumstances," Walsh said.

CLI has sold less than 1,000 units of the ISDN-based Cameo kit for the Macintosh since it shipped last September, Walsh said, largely blaming the \$4,000 price tag on the equipment needed for ISDN usage.

Although CLI supports the H.320 international standards in its room systems, the company's desktop Cameo system is based on a CLI proprietary algorithm, meaning users cannot videoconference with other vendors' systems. Implementing the standards is considerably more expensive, Walsh noted. "The computing industry is more concerned about the valid answer at a right price point," he said. "Customers will buy what solves their problems."

©CLI: (408) 435-3000.

AT&T

Continued from page 3

rier. Kavner, formerly head of communications products, will be leading AT&T into the brave new world of interactive entertainment.

In other changes, Richard McGinn, 46, will become president of AT&T network systems, and Alex Mandl, 49, will assume the post of executive vice president of communications services.

The only outsider brought in was Richard Miller, 52, of Wang Laboratories, Inc., who will become an AT&T executive vice president and chief financial officer.

Mandl, formerly chief financial officer, figures to be one of the key appointments in the shuffle.

Succeeding Pelson as head of long-distance services, Mandl will oversee the division that brings in close to two-thirds of AT&T's revenue.

As one of only two executives in the shift still in his 40s, he will be young enough to be considered for the chairmanship when Allen steps down within the next seven years.

"Shifting Alex Mandl from chief bean counter to head of business communications services — that is a very significant move," said one observer. "I would not underestimate the importance of that, both for Alex Mandl and for the business communications services."

As for Allen's international ambitions, Gerald Mayfield, senior director with the consulting firm of MJL & Co. in Ramsey, N.J., questioned whether the company can achieve its goal of landing 50% of its revenue from overseas markets.

He pointed out that of the countries in Europe and on the Pacific Rim, only the U.K. has substantially deregulated its telecommunications market.

Despite the problems, AT&T still has room for growth. For example, Russia recently committed to investing \$1 billion in telecommunications infrastructure, representing a vast new market for AT&T's networking equipment. □

IBM prepping new versions of LAN Server

BY CHRISTINE BURNS AND CARYN GILLOOLY

Austin, Texas

IBM last week said it plans to enhance its LAN Server network operating system by integrating multimedia features and OFS DCE services in separate releases scheduled within the next six months.

The initial release, set for late September or early October, will add multimedia support to LAN Server 3.0. The later version, which an IBM official referred to as 4.0, will be shipped in limited supply early next year.

As expected, it will incorporate Open Software Foundation, Inc. Distributed Computing Environment technologies such as security and directory services (NW, June 21, page 8).

IBM will use these developments as building blocks toward supplying users with a platform for distributed client/server applications in the future.

"We're working on [LAN Server] 4.0 to assure people that we are serious about LAN Server," said Art Olbert, director of IBM's Personal Software Products' LAN Systems Division, referring to the major overhaul expected early next year.

Central to the fall release, which Olbert referred to as LAN Server 3.1, is the addition of multimedia support that lets LAN Server clients access multimedia applications over a local-area network. The technology involved in the scheduled release was outlined last year in an IBM white paper and is currently in beta test (NW, Dec. 7, 1992, page 1).

The software provides an extended file attribute for each file created under LAN Server 3.1 that allows the server to identify and track multimedia sessions on the network. Session requests that would exceed the available bandwidth and adversely affect existing multimedia or other sessions would then be locked out. Multimedia sessions will be given priority over traditional data to ensure audio and visual synchronization.

"This prioritizing of data is going to cut down on the degradation of the real-time data that you may have now if you're transporting [multimedia traffic] over a LAN," said Scott Haugdahl, senior technology consultant with the Minneapolis-based consultancy Architecture Technology Corp.

DCE ADDITIONS

The DCE technologies to be incorporated into LAN Server 4.0 work together to help users find and access resources on the network. DCE directory services allow servers to share directory data, while the security features, based on Kerberos, form a cross-domain trust that makes it easier for users to access resources on any server, regardless of the network domain in which it resides.

DCE remote procedure calls provide a standardized means for applications to communicate with one another and with other services, while the time services ensure that various system events are synchronized.

IBM has said that further down the road, it will also include DCE's Distributed File System (DFS) resource manager with LAN Server. DFS allows any authorized user on a network to access any file, regardless of where it is stored on the net.

"DFS will fit very well into LAN Server, based on the fact that its users have got distributed files that they'll want to get at eventually," said Frank Dzubeck, president of Communications Networks Architects, Inc., a Washington, D.C. consultancy. "But nobody is really screaming for DFS right now because the other [required DCE] services aren't in place yet." □

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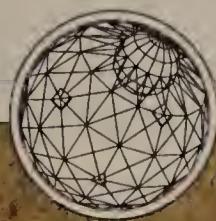
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Vendors vie for piece of client/server accounting market

Users to have ample choice of financial applications.

BY WAYNE ECKERSON

Framingham, Mass.

Users looking to implement client/server financial applications will have plenty of choices in the coming year as a slew of software vendors gear up to unveil or bolster network-based accounting products.

Dun & Bradstreet Software, a dominant provider of mainframe-based financial software, last week announced it will soon ship Financial Stream, a client/server accounting package that incorporates sophisticated work flow and decision support technology.

Not to be outdone, start-up PeopleSoft, Inc. last week scored a major coup in signing a contract with NCR Corp. worth roughly \$1 million. NCR is licensing PeopleSoft's complete line of client/server financial products, most of which are still in beta test, as well as its client/server human resources software. In addition, NCR has agreed to resell PeopleSoft products on NCR's System 3000 processors.

According to analysts, the market for packaged client/server financial software is wide open and there will be many competitors vying for the top spot. These include traditional mainframe and mid-range application vendors, such as SAP America, Inc., Oracle Corp. and Lawson Software, Inc., as well as relative newcomers, including Platinum Software Corp., FlexiWare Corp. and FourGen Software, Inc. (see graphic, this page).

"Users are extremely confused about what's out there, so it will take a few years for the market to shake out," said Jennifer Scholze, an analyst at International Data Corp. in Framingham, Mass.

However, Scholze predicted that the market for client/server financial applications will balloon from \$69 million last year to \$1 billion in 1997. Most of the growth will

come from users that want to downsize mainframe applications, reengineer business processes using client/server software or consolidate a hodgepodge of financial applications used throughout the company.

SURVEYING THE FIELD

To capture a piece of this rapidly growing market, vendors are trying to differentiate themselves in a number of ways. Some are integrating value-added features, such as decision support, work flow and electronic mail, while others boast links to various enterprise processes, including distribution, materials management and manufacturing. Still others are riding the crest of object-oriented programming techniques.

D&B Software will be a strong contender, primarily because of its huge installed base. The company has 10,000 customers worldwide, 90% of which use its host-based financial software, according to D&B Software officials.

"D&B Software customers are banking on the fact that D&B will provide them with an easier migration path from host-based to client/server-based financial processing than other vendors [will]," said Tim Harmon, program director of work group computing strategies at META Group in Westport, Conn.

But Financial Stream offers many advantages. It incorporates work flow and decision support technology and enables users to manage financial processes, such as payments and revenues, rather than segmented applications, such as general ledger and accounts receivable. As such, Financial

To capture a piece of this rapidly growing market, vendors are trying to differentiate themselves in a number of ways.

Stream makes it easier to automate financial activities and support business process reengineering efforts, D&B Software officials said.

Unlike most client/server accounting software, the strength of PeopleSoft Financials is that the majority of the processing occurs on the client, not on the server. This provides better integration with desktop applications and gives users greater control over querying and reporting capabilities, among other things, PeopleSoft officials said.

SAP America made a big splash earlier this year when it launched R/3, a client/server version of its host-based software, which is used by many major multinational firms. The strength of R/3 is that it offers a number of robust, integratable modules for financial, manufacturing, distribution and purchasing applications, among others.

Less known are vendors such as FourGen and Platinum Software, which have been selling client/server financial software for a year or more. FourGen claims to have its software installed in 1,200 sites, a sizable number considering that it runs only on Informix Software, Inc. databases.

Perhaps the dark horses of the client/server accounting market are Kapre Software, Inc. and FlexiWare, both of which have built software using object-oriented programming languages. For Kapre, this means knowledge workers will have the ability to adapt financial software to their business environments and establish work flow routines without programming skills.

Analysts also project that vendors developing object-oriented financial software will be able to bring out new modules and features in response to customer demand in a fraction of the time it takes vendors using traditional development techniques.

"If the object-oriented vendors play it right, they could be the next generation of client/server financial software," Scholze said. □

Hughes to roll out Windows-based hub mgmt. app.

BY SKIP MACASKILL

Mountain View, Calif.

Hughes LAN Systems, Inc. (HLS) next month will bolster its network management offerings with a hub management application for Hewlett-Packard Co.'s Windows-based OpenView platform.

HLS Enterprise Hub Management Application will be the first in the new 20/20 Network Manager family of Simple Network Management Protocol-based management applications for OpenView, products aimed at easing the management and configuration of HLS devices in a network. Future 20/20 applications will address other Hughes devices, including internetworking and Asynchronous Transfer Mode products now under development.

The hub management application will initially provide management and control down to the port level of HLS' five- and 14-slot intelligent Enterprise Hubs, including its Ethernet, token-ring, terminal server and management modules.

The second release will add support for HLS' recently introduced Fiber Distributed Data Interface hub and bridge modules.

"We're not in the business of creating platforms," said Jackie Ross, director of field marketing at HLS. "We want to concentrate on providing applications that will simplify the process of managing and configuring our hubs using full-function SNMP capabilities."

The application features a HubView function that allows the net manager to graphically portray an Enterprise Hub and the modules contained within it.

Once configuration information is entered on the net management module for a particular hub, HubView can access that data and automatically build the chassis topology. By clicking on individual ports, the net manager can glean a variety of information, including packets received, as well as a log of the number of bad packets, multicasts and frame-check errors.

The Enterprise Hub Management Application will be available next month. Pricing will be determined at that time.

Client/server financial applications

Company	Product name	Functions supported	Client	Server	Database	Ship date	Price	Distinctive feature	Phone number
Dun & Bradstreet Software	Financial Stream	All processes except receivables	DOS/Windows	HP-UX, DG-UX	Sybase SQL Server	September	\$225,000+ per module	Robust decision support and work flow features	(404) 239-4636
FlexiWare Corp.	FlexiPayables	General ledger, accounts payable	Windows	OS/2, NetWare, AIX	Microsoft SQL Server, Gupta SQLBase, Oracle Server	Available now	\$50,000-\$75,000 per module	Object-oriented business rules	(203) 925-3040
FourGen Software, Inc.	Enterprise	General ledger, payables, receivables, order entry, inventory control, purchasing, fixed assets, payroll	X terminal, Unix workstations	Most Unix platforms	Informix On-Line	Available now	\$45,000+ per module	Installed at 1,200 sites	(800) 333-4436
KaPRE Software, Inc.	Kapre Financials	General ledger, receivables, payables, purchasing, inventory	X terminal, Sun Solaris, OSF/1	Sun Solaris, OSF/1	Sybase SQL Server, Oracle Server	Year end; Fixed assets, late 1994	\$4,000 - \$100,000 per module	Object-oriented work flow features	(303) 938-8805
Lawson Software, Inc.	Lawson Accounting System/Open Enterprise Release	General ledger, receivables, payables, fixed assets, project accounting, cost allocation, budgeting	Windows, character-based	AS/400, most Unix platforms	Oracle Server, Informix On-Line, Sybase SQL Server	Available now	\$24,000+ per module	Open system support	(800) 477-1357
Oracle Corp.	Oracle Financials	General ledger, payables, receivables, purchasing, order entry, revenue and project accounting, inventory, asset management	DOS/Windows, most Unix platforms, DEC VMS	Most Unix platforms, DEC VMS, MVS	Oracle Server	Available now	\$10,400 - \$26,000 per module	Optimized on Oracle database management system	(800) 633-0583
PeopleSoft, Inc.	PeopleSoft Financials	General ledger, payables, receivables, asset management	Windows 3.1	OS/2, MVS, VMS, HP-MPE, Unix	Microsoft SQL Server, Gupta SQLBase, HP Allbase/SQL, Oracle Server, DEC Rdb and IBM DB2	Year end, except general ledger, which is available now	\$100,000 - \$300,000 per module	Early provider of client/server human resources software	(404) 239-2000
Platinum Software Corp.	SeQuel To Platinum	General ledger, payables, receivables, inventory, cash management	Windows, OS/2	OS/2, most Unix platforms, Windows NT	Sybase SQL Server	Available now	\$50,000 - \$125,000 per module	Optimized to Sybase	(800) 426-0469
SAP America, Inc.	R/3	Payables, receivables, general ledger, cash management, fixed assets, cost accounting	Windows, OS/2, X terminals running Motif	Unix, DEC OpenVMS, HP MPE-IX	Oracle Server, Software AG Entire SQL	Available now	\$100,000+	Integration with manufacturing, distribution and purchasing functions	(800) 872-1727

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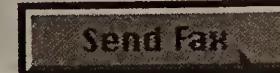
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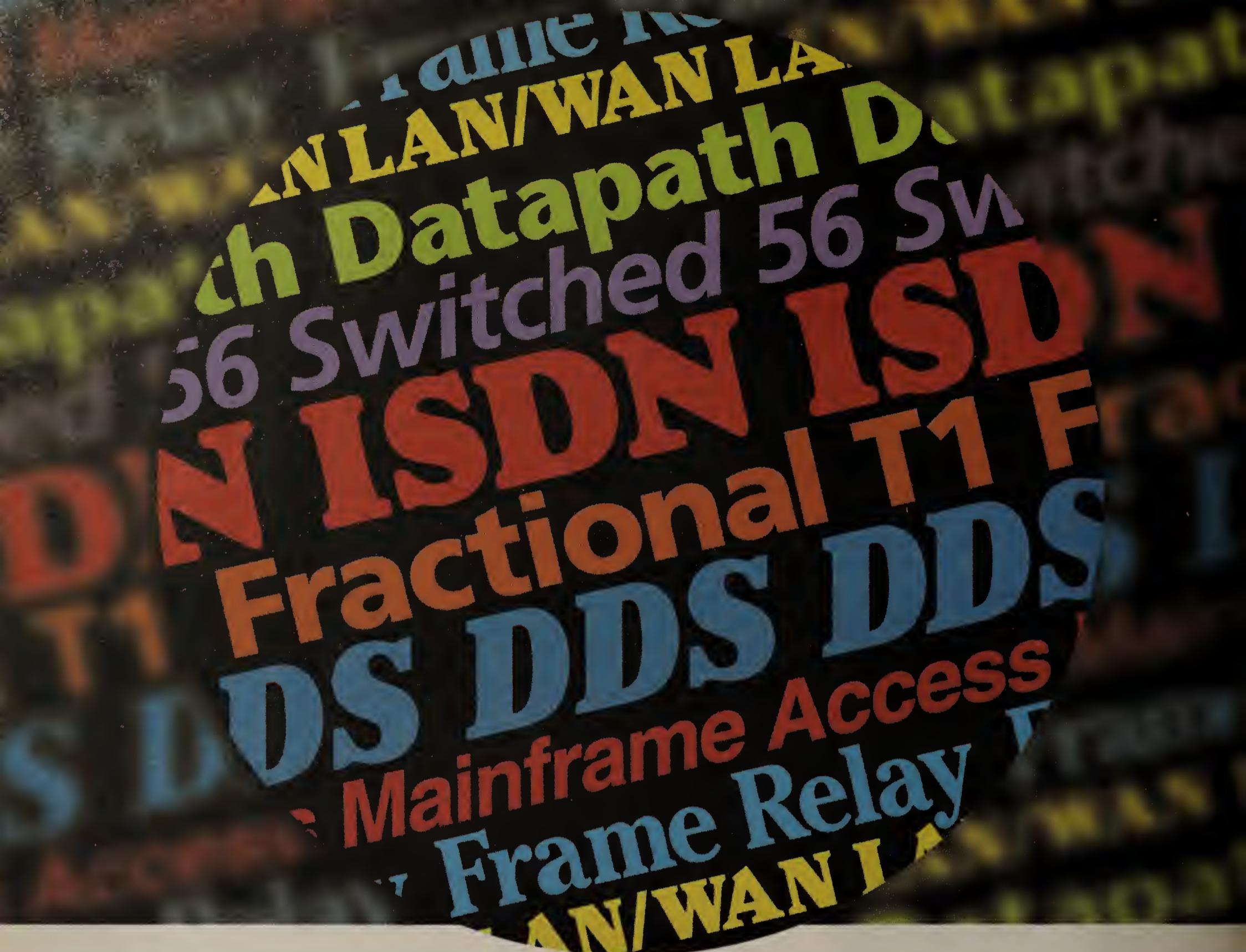


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Memorex Telex expands its enterprise role

BY MICHAEL COONEY

Raleigh, N.C.

Memorex Telex Corp. has added new TCP/IP and SNA features to its host gateway that promise to let users more easily and inexpensively gain access to IBM mainframe resources.

Memorex Telex added to its 9430 Enterprise Gateway a new local-area networking option for devices linked to LANs as downstream physical units (DSPU) as well as support for Transmission Control Protocol/Internet Protocol clients.

Memorex Telex also announced a high-end addition to its 86XX LAN server family. The 8650 Open Systems Host is a multiprocessor server designed for large-scale communication and application-serving environments, the company said.

On the gateway front, the 9430 attaches to a mainframe channel and lets users on token-ring, Ethernet or Fiber Distributed Data Interface LANs access Systems Network Architecture host resources. The product is based on Intel Corp.'s 80486 MicroChannel platform running Novell, Inc. NetWare for SAA gateway software.

Each 9430 supports one 4.5M byte/sec channel attachment to an IBM host or two 56K bit/sec Synchronous Data Link Control connections to two hosts. Both configurations can support a maximum of 254 host sessions per link. The gateway supports up to four LAN interfaces.

The 9430 is optimized to support NetWare clients but also supports clients running 3270 emulators from Attachmate Corp., Digital Communications Associates, Inc. and Wall Data, Inc. It supports DOS, Windows, Macintosh, OS/2 and Unix clients in all of those environments.

The new DSPU and TCP/IP features are NetWare Loadable Modules (NLM) that run on the 9430. The DSPU NLM provides IBM host support for physical units located downstream on a token-ring, Ethernet or FDDI connection. The physical units can be any 802.2-type PU 2.0 or 2.1 device, such as SNA communications controllers including IBM 3174s or Memorex 1174s, servers, personal computers or Application System/400s, and other NetWare for SAA gateways.

Memorex Telex positions the 9430 as a high-performance host attachment mechanism and an alternative to installing remote 3745 front-end processors.

"With the DSPU support and the channel connection, users can get up to 1M bit/sec throughput capacity and subsecond response times from their LAN to the host," said Jay Morrison, director of product marketing for Memorex Telex. "That's almost twice as fast as traditional LAN-to-host gateways."

The DSPU NLM also lets the IBM NetView host network management system track devices all the way to clients on the LAN. In the past, NetView could only see down to the gateway, and if there were problems beyond that, the NetView operator could not detect or resolve them, Morrison said.

The DSPU NLMs can be reconfigured while online. DSPU can also be added, activated and deacti-

See Memorex Telex, page 15

DEC, Cisco map different routes to DECnet/OSI

Companies tout respective migration schemes.

BY JIM DUFFY

Digital Equipment Corp. and Cisco Systems, Inc. are providing two different approaches for migrating DECnet Phase IV users to DECnet/OSI, but each has benefits and drawbacks.

Both vendors use the same DEC-developed algorithms for converting Phase IV packets to DECnet/OSI packets, but DEC's approach is based on integrated routing while Cisco recommends a ships-in-the-night approach.

With integrated routing, multiple routable protocols are passed from router to router using the same routing algorithm. With the ships-in-the-night approach, different routing algorithms are used to route different protocols.

DECnet Phase IV is a routing vector algo-

rithm, while DECnet/OSI supports the Integrated Intermediate System to Intermediate System (IS-IS) protocol, which is a link-state routing algorithm.

Routing vector algorithms calculate routes based on information from adjacent routers. Link-state algorithms allow all routers in a network domain — referred to as an "area" in DECnet terminology — to share route information whether they are adjacent to one another or not.

Routers supporting link-state algorithms only share information when there is a change in the network configuration, while routers that use routing vector methods exchange information at regular,

predefined intervals. In addition, link-state algorithms have a faster convergence time than the routing vector algorithms, meaning routers based on them can route around failed links faster than routers that use routing vector algorithms.

DEC's migration scheme allows users to deploy only one routing algorithm — either routing vector or link-state — per DECnet area. But DEC specifies that interarea rout-

See DEC, Cisco, page 17

Different routes

Digital Equipment Corp.	Cisco Systems, Inc.
• Integrated routing, which minimizes management and administration but may decrease performance due to multiple packet translations.	• Ships-in-the-night routing, which facilitates a more gradual migration and offers more flexibility but consumes more memory.
• One routing algorithm per DECnet area (either routing vector or link-state).	• Two routing algorithms per DECnet area and for interarea routing (routing vector and link-state).
• Link-state algorithm for interarea routing.	

DEC and Cisco have different methods for mixing DECnet Phase IV and DECnet/OSI networks, as well as for migrating Phase IV users to DECnet/OSI.

SOURCE: DEC, MAYNARD, MASS. AND CISCO, MENLO PARK, CALIF.
GRAPHIC BY TERRI MITCHELL

Micom, Teleglobe target remote sites

BY MAUREEN MOLLOY

San Francisco

Micom Communications Corp. and Teleglobe Communications, Inc. separately will announce at INTEROP 93 next month new products that will simultaneously carry data, voice and facsimile traffic over leased lines.

Micom is expanding its existing NetRunner Data/Voice Internetwork Node (DVIN) line, while new entrant Teleglobe will unveil its first product, which integrates a variety of data, voice and fax traffic.

Kenneth Guy, Micom's vice president of corporate strategy and business development, said

the NetRunner family enables users to interconnect remote Ethernet local-area networks as well as consolidate multiple dial-up and leased lines over a single wide-area link.

The two additions include the NetRunner 50E for small sites and the NetRunner 1000E for larger, more complex nets. Both will let remote sites that previously employed separate dial-up lines for transmitting voice and fax traffic to a central site now squeeze that traffic together with bridged LAN data over a leased line.

The 50E supports two data channels at speeds up to 38.4K bit/sec, a maximum of four voice/fax channels at speeds up to 16K bit/sec and an Ethernet over a single 64K bit/sec wide-area link.

The NetRunner is equipped with voice and data compression capabilities that enable it to compress 9.6K bit/sec of fax traffic to 2,400 bit/sec and compress voice to 16K bit/sec.

In addition, it supports 4-to-1 data compression so that 19.2K bit/sec of data traffic can be com-

See Micom, page 15

BRIEFS

Concord Communications, Inc. last week announced it has added 4M and 16M bit/sec token-ring support to its Trakker internetwork monitor, which previously monitored nodes residing on Ethernet local-area networks only.

Trakker consists of software running on a Sun Microsystems, Inc. SPARCstation and monitors residing on each net segment. The segment monitors gather net statistics and send them to the workstation, where the software maintains a database of the statistics and provides reports on net activity.

Trakker Token Ring segment monitors are available now and cost \$6,300 for an 8M-byte monitor and \$7,500 for a 16M-byte monitor.

Concord: (508) 460-4646.

Advanced Computer Communications (ACC) last week announced a Four-Port Ethernet Module for its ACCes/4500 Enterprise Hub.

The new Reduced Instruction Set Computing module is designed to enable users to concentrate as many as 44 local Ethernet local-area networks into a single 11-slot ACCes/4500 intelligent hub chassis.

The new module is available now and costs \$8,550.

ACC: (408) 864-0600.

Cascade Communications Corp. last week announced that **Siemens Stromberg-Carlson** will resell the Cascade STDX(TM) family of frame relay switches. Siemens will offer the STDX 3000 and

STDX 6000 as frame relay access switches in conjunction with the Siemens Stromberg-Carlson EWSM Cell Switching Network.

The Bell Atlantic Corp. telephone companies are expected to be the first Siemens customers to deploy the Cascade STDX for local exchange carrier frame relay service.

Cascade: (508) 692-2600.

Wellfleet Communications, Inc. announced the availability of a new guide called "Integrating SNA & Multiprotocol LAN Networks," which outlines the different methods IBM users can take to merge their Systems Network Architecture traffic onto multiprotocol router networks.

To obtain the free guide, contact Wellfleet at (508) 670-8888.

Texas Microsystems, Inc. last week See Briefs, page 17

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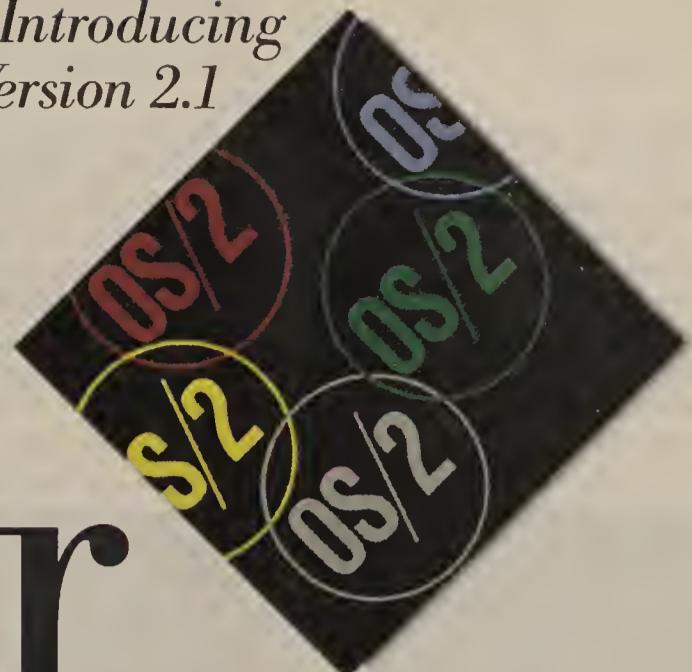
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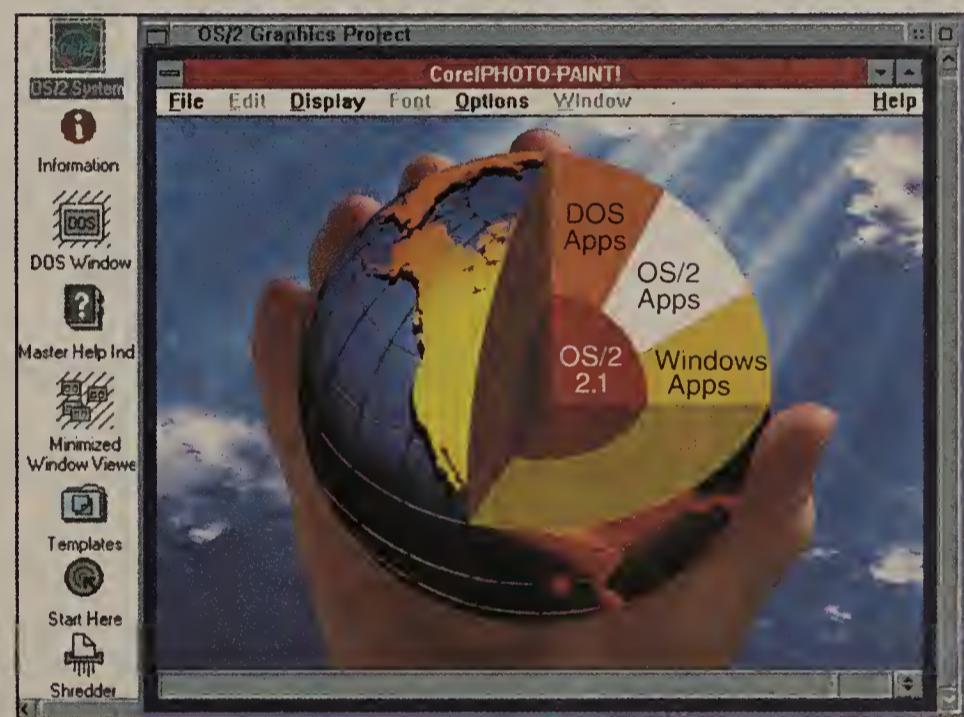


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DEC, Cisco

Continued from page 14

ers be DECnet/OSI routers, which support Integrated IS-IS.

End nodes, meanwhile, can be either Phase IV or DECnet/OSI, regardless of which routing algorithm is used in that area.

For example, if a packet originates at a Phase IV node in a Phase IV (routing vector) area but is destined for a Phase IV end node in a DECnet/OSI area, it traverses its own area as a 16-bit DECnet Phase IV packet. When it

reaches the router that will link it to the DECnet/OSI area, the packet is translated into a DECnet/OSI packet with a DECnet/OSI address.

The packet is then routed through the DECnet/OSI area as a DECnet/OSI packet. When it reaches its Phase IV destination node, the router for that end node will translate the address back into a Phase IV address and the packet will be delivered as a Phase IV packet.

DEC believes using one algorithm per area saves network managers from a lot of headaches.

"Integrated routing provides a series of

advantages in networks, particularly for administering and managing only a single routing protocol," said Bill Duane, DEC technical director of network operating system engineering. A ships-in-the-night approach treats all the components of the network as separate subnets, meaning routing algorithms have to be managed and administered as independent entities, even though they are in the same router, he said.

Cisco also supports the integrated method but believes the ships-in-the-night approach provides a much smoother migration. Cisco allows both the Internet Gateway Routing Pro-

toocol, which is a routing vector algorithm, and Integrated IS-IS to be used in the same DECnet area and for interarea connections. That way, a Phase IV or DECnet/OSI packet will always traverse the network in native mode.

Cisco claims its ships-in-the-night approach allows users to gradually migrate their Phase IV networks to DECnet/OSI by incrementally adding DECnet/OSI routing to their Phase IV areas. With DEC's approach, users either have to keep all the routers in an area Phase IV or switch them all at once to DECnet/OSI.

"People who run networks tend to be a little nervous about making big changes all at once," said Paulina Knibbe, a software product manager at Cisco.

Cisco's method also improves performance because packets are routed in native mode and are not translated as much as they are with DEC routers, Knibbe said. She acknowledged, however, that a ships-in-the-night approach consumes more memory than the integrated method. Nonetheless, some users find the Cisco technique more flexible.

"If you are taking the DEC approach, you have to make sure that all your routers within one particular area have to go from one routing algorithm to the other," said Phil DeMar, a network analyst at Fermi National Accelerator Laboratories in Batavia, Ill. "The Cisco approach says you don't have to worry about switching all your routers from one routing algorithm to the other at the same time. I think there's a little more flexibility in that."

However, Henk Hazelhoff, associate consultant for corporate information systems at The Dow Chemical Co. in Midland, Mich., already has a large installed base of DEC routers. Hazelhoff said he does not consider any benefits gained by the Cisco approach worth the pain of swapping out all of his routers.

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Circle Reader Service #25

BRIEFS

Continued from page 14

announced its NetGenesis LAN internetwork server, a new chassis-based device that merges the functions of a hub, router and server into a single device.

The NetGenesis interconnects Novell, Inc. NetWare local-area networks and is targeted at users that want to link those LANs back to a central office.

The NetGenesis server uses an Intel Corp.-based platform that supports any combination of as many as 20 router, hub, communications server or file server modules all running Novell software, thereby enabling a single internetwork server to replace several personal computer-based systems.

Texas Microsystems struck an OEM agreement with Novell to install Novell's entire line of software, including NetWare 3.11 and 4.0, NetWare Multiprotocol Router, NetWare for SAA, WAN/Links Hub Services, and NetWare Asynchronous Communication Server/NetWare Access Server.

The NetGenesis Internetwork Server comes equipped with hardware fault tolerance in order to supplement Novell's SFT II and SFT III services, including dual, hot-swappable power supplies and mirrored disks.

Texas Microsystems: (713) 541-8200.

BRIEFS

Winchester Systems, Inc. last week rolled out a superserver on a card residing in Extended Industry Standard Architecture (EISA)-based personal computers, along with the company's FlashServer line of net storage cards. The FlashServer Superserver, which consists of a 486-based CPU and 32M bytes of cache memory, turns an EISA machine into a superserver, with performance rates of 6,000 I/O operations per second.

Up to five superserver cards can be installed in an EISA PC, with each card supporting from 30 to 250 users. The card features two independent Small Computer System Interface channels and 24 million instructions per second of total processing power. Driver support includes DOS, Unix, OS/2 and Novell, Inc. NetWare. Available now, FlashServer Superserver ranges in price from \$3,955.

Winchester: (800) 325-3700.

LANNET Data Communications, Inc. last week enhanced its LANswitch product line by adding virtual local-area network capabilities. LANswitch — which consists of LANNET's LET-36 or LET-10 intelligent hub, with a 1.28G bit/sec backplane and 10Base-T modules that have their own switching fabrics, dubbed 10Base-TV — allows users to run multimedia applications over existing Ethernet networks.

The capability lets net managers group users on different LANs or wide-area nets in logical work groups across several hubs. Up to 256 virtual Ethernets can be created as separate LAN domains. The new capability, to be available in the fourth quarter, runs on LANNET's MultiMan/OV net management application.

The company also announced availability and pricing for the 10Base-TV modules. The 10Base-T models range in price from \$1,995 to \$5,995, with partial availability in the third quarter and full availability expected by first-quarter 1994. Thin-net and fiber modules will be available in the first half of next year, and pricing has not been set.

LANNET: (714) 891-5580.

Answering **3Com Corp.**'s challenge, Standard Microsystems Corp. (SMC) last week introduced its Elite Ultra line of Ethernet network interface cards (NIC), which are similar in functionality to 3Com's EtherLink III NICs. The NICs feature SMC's SimulTasking technology, which allows multiple data transfer processes to be performed simultaneously. SMC has also integrated three chips supporting Ethernet controller, coder/decoder and bus interface functionality onto a single chip, thereby reducing overhead and cost.

Available now, the Ultra Elite line consists of 16-bit Industry Standard Architecture-based adapters for 10Base-T, 10Base2 and a combination card, which has RJ-45, BNC and attachment unit interface ports, and supports thin and thick coaxial cable and 10Base-T connections. Pricing starts at \$129 per card.

SMC: (800) 762-4968.

Apple shuffle raises some enterprise mart concerns

Observers question long-term commitment.

BY FREDRIC PAUL

Cupertino, Calif.

Apple Computer, Inc.'s recent reorganization and massive job reductions are fueling perceptions that the company is wavering in its commitment to the enterprise market.

The changes, which were expected (NW, July 12, page 4), came as Apple fights the effects of a vicious price war in desktop systems, a weak European market and delays in releasing new products such as its Newton personal digital assistant. These troubles have combined to erode the company's profit margins and put pressure on all aspects of its business, including networking products.

To respond to that pressure, Apple's new chief executive officer, Michael Spindler,

has begun issuing pink slips to some 2,500 employees and has taken a massive \$320.9 million charge against earnings in the company's third fiscal quarter, ended June 25, leading to a net loss of more than \$188 million.

On the organizational front, Apple has streamlined its structure from eight divisions into five and restructured the Enterprise Systems Division (ESD) into the Apple Business Systems (ABS) Division with a more limited set of product responsibilities. ABS also boasts a new focus on work groups, small businesses and the educational market as well as the enterprise as a whole.

While Apple clearly needed to

cut costs, observers worry that emasculating ESD will fuel perceptions that Apple is not fully committed to the enterprise market.

"I think it will make it more difficult" for Apple to sell itself as an enterprise networking solution, said John Morency, a principal consultant at Strategic Networks Consulting, Inc. in Rockland, Mass.

The people at ESD were specialists in enterprise markets, said Pieter Hartsook, editor of The Hartsook Letter, a Macintosh market research service in Alameda, Calif.

See Apple, page 22

Under the ABS umbrella

Products/technologies governed by Apple Business Systems:

LAN-based systems:

Apple Workgroup Servers, AppleShare, AppleSearch, AppleTalk Internet Router, AppleTalk Remote Access and the IBM alliances

Connectivity hardware:

Ethernet and token-ring cards, connectors and cabling

Open systems software:

Macintosh on Unix and PowerOpen

Enterprise technologies:

Virtually Integrated Technical Architecture Lifecycle and the Taligent, Inc.-joint venture with IBM

SOURCE: APPLE COMPUTER, INC., CUPERTINO, CALIF.
GRAPHIC BY SUSAN J. CHAMPEY

Microtest tool to link CDROMs to NetWare LANs

BY FREDRIC PAUL

Phoenix

Microtest, Inc., known primarily for its network troubleshooting and management products, this week plans to introduce Discport, a hardware/software offering that enables users to access CDROM drives as if they were standard hard drives on a file server.

Compatible with Novell, Inc.'s NetWare 3.11 and NetWare 4.0, Discport is said to give users access to all NetWare features, including high-speed disk caching, drive mapping and security.

Discport lets users connect CDROM players to a NetWare local-area network and publish those drives to users on the network, explained Robert Wilkinson, Microtest's director of new business development.

CDROM disks appear as a NetWare volume on the server. "You don't need any extra software on your workstation," Wilkinson said. Other types of network solutions for CDROM drives, he said, typically require separate control software on each user's personal computer.

Users may attach Discport directly to the network cabling at any point, while some competing products require connection directly to the server, or at least to a dedicated workstation, he said. That is important because many companies want to designate a library

Discport is said to give users access to all NetWare features, including high-speed disk caching.

See CDROM, page 22

Alantec enhances switching hub with mgmt. capabilities

BY SKIP MACASKILL

San Jose, Calif.

Alantec Corp. last week enhanced its intelligent switching hub with a management capability that makes it possible to monitor traffic on Ethernet or FDDI segments from a single location.

The new Port Monitoring capability, which comes as a standard software feature with any new PowerHub, dedicates one port of the 12-port switching hub to a protocol analyzer or Remote Monitoring (RMON) probe that can track network utilization, monitor traffic patterns and analyze segment communications.

The new functionality will also allow network managers to use their time more efficiently, according to Yancy Lind, Alantec's director of marketing.

"By attaching a protocol analyzer or RMON probe to a port on the PowerHub, network administrators can analyze multiple Ethernet and FDDI networks from a central location, eliminating the need to physically visit each segment site to compile data," Lind said.

Port Monitoring can also save money by reducing the need for distributing multiple RMON probes across the network, Lind added.

Until now, users have purchased RMON probes for each remote device, but the new Port Monitoring capability

allows network managers to download an RMON agent to the device in question.

Since the PowerHub can also convert Fiber Distributed Data Interface packets into Ethernet frames, the new functionality allows network managers to monitor FDDI traffic without the expense of purchasing an FDDI analyzer.

"It won't give you the sophisticated, minute details of an FDDI-specific device, but it does provide enough general data and information to do daily management," according to Lind.

Port Monitoring can simultaneously monitor multiple segments so net managers can view communications between selected ports on the network. The capability can also be utilized across multiple PowerHubs, which increases the number of segments that can be monitored.

"While SNMP provides device-based management information, like the number of packets sent and received, Port Monitoring allows us to go a step further," Lind said. Users can obtain an end-to-end view of a network segment, not just gather device activity, he explained.

Port Monitoring is available now for all new PowerHubs free of charge. For existing users, the new capability is available through Release 2.3 of the hub's software.

©Alantec: (408) 955-9000.

NPI crashes ATM adapter market with some help from Syn Optics

BY SKIP MACASKILL

Milpitas, Calif.

Network Peripherals, Inc. (NPI) is trying to get by with a little help from its friends.

The adapter card maker last week made its foray into the Asynchronous Transfer Mode (ATM) market when it announced plans to jointly develop a line of ATM adapter cards with SynOptics Communications, Inc.

Through the agreement, NPI will develop and manufacture net interface cards based on SynOptics' Fast Matrix ATM technology. The cards will work with high-end Sun Microsystems, Inc. SBus workstations as well as Extended Industry Standard Architecture (EISA)- and Micro Channel Architecture (MCA)-based personal computers.

SynOptics will be providing three key portions of the ATM technology it developed in conjunction with Washington University's Computer Science Department in St. Louis.

"We'll provide NPI with technology for the various physical layers such as the physical media dependent layer that the ATM Forum has specified," said John Jaeger, product manager for ATM products at SynOptics. "We'll also provide the segmentation and reassembly functionality, as well as the signaling scheme, which conforms to the one being defined by the ATM Forum for switched virtual channels."

All the adapters will support ATM at 155M bit/sec via a choice of media, including multimode fiber,

shielded twisted pair and Category 5 unshielded twisted pair.

SynOptics has already announced its plans to offer an SBus adapter based on technology from Sun in the fourth quarter. The NPI SBus card will be an enhanced version of the Sun adapter, said Gordon Stitt, vice president of marketing at NPI.

"The Sun card will be packaged with drivers for the Solaris operating system, and we'll improve on that by adding drivers for SunOS and performing compatibility testing and verification," Stitt said.

The NPI SBus card is expected to ship in January. Similar to the Sun card, it will be priced less than \$1,300.

Because NPI believes ATM will initially be a server technology, it is also developing EISA- and MCA-based ATM adapters — the most common bus types utilized in servers. "The real production installations will initially be on servers," Stitt said. "As ATM becomes installed as a corporate backbone, then connecting servers directly to it will become attractive for users."

Plans to develop an Industry Standard Architecture-based ATM card would be a logical follow-on, he added. Other vendors that have announced plans to offer PC-based ATM cards include Fore Systems, Inc. and Newbridge Networks, Inc.

The EISA and MCA cards will ship in the second quarter of 1994 and will likely cost a few hundred dollars more than the SBus model.

©NPI: (408) 321-7300.

Because NPI believes ATM will be a server technology, it is developing EISA- and MCA-based adapters.

BusLogic ushers in RAID fault tolerance for NetWare 4.0 users

BY CARYN GILLOOLY

Santa Clara, Calif.

BusLogic, Inc. this week is expected to bring RAID-level fault tolerance to high-end network operating system users with a version of its disk array software that runs over Novell, Inc. NetWare 4.0 LANs.

In addition to NetWare 4.0 compatibility, BusLogic's Paragon Disk Array Software can now reconstruct failed drives in half the time it previously took. The software also has new remote diagnostic capabilities that let administrators view the status of the net's disk array from any workstation on the enterprise.

Paragon is software that provides Redundant Array of Inexpensive Disks (RAID) Level 0, 1 or 5 fault tolerance to an array of ordinary Small Computer System Interface (SCSI) drives.

A PMonitor utility has been added to let administrators see the status of an array from any workstation connected to a local-area net, or even one connected over a wide-area net.

According to Frank Bellucci, engineering manager at BusLogic's Chantal

Systems Division in San Diego, PMonitor is a graphical utility that provides information such as number of reads and writes per drive, as well as the status of each drive.

Bellucci said the company plans to add to future releases the ability to set array thresholds that, when met or exceeded, will trigger a remote or local alarm, although he would not provide a time frame for this capability.

The improved drive reconstruction capabilities are possible through a new Smart Update function added to the software. With Smart Update, the system itself determines which information on the array needs to be updated — through a parity and data mismatch check — then updates only the missing information, increasing performance by as much as 50%. Previously, the software reconstructed the entire drive, not just the missing information.

"We've cut drive reconstruction time by half, reducing it from 30 minutes to 15 minutes," Bellucci said.

Paragon 4.0 Disk Array Software for NetWare is available now for \$995.

©BusLogic: (408) 492-9090.



Tektronix makes major strides in X-terminal mart

Firm touts chip duo, issues X-terminal mgmt. upgrade.

BY CHRISTINE BURNS

Wilsonville, Ore.

Tektronix, Inc. last week unveiled a series of X terminals it says offers up to 80% greater performance than competitive products. Separately, the company also released a new version of its ExpressWare X-terminal software that eases remote network management.

The processing gains of the TekXpress XP350 series of X terminals is due to the integration of LSI Logic Corp.'s LR33020 Graph X processor, a Reduced Instruction Set Computing (RISC) chip that combines a CPU core with an on-board graphics coprocessor along with TekXpress hardware.

The XP350 models are designed for use in high-speed graphics applications, such as computer-aided design, Geographic Information Services electronic mapping and image processing.

A controller and three desktop models

make up the XP350 series. The XP350 controller supports only one terminal, which can be an existing Tektronix X terminal or any other monitor that complies with 18 pixel resolution/refresh rate combinations defined by Tektronix.

The Model XP354 is a 19-in. monitor with 256 shades of gray and resolution of 1,280 by 1,024 pixels. Two color models, the 19-in. XP358 and the 17-in. XP356, have the same resolution. Available Aug. 9, prices range from \$2,495 for the XP350 controller to \$5,495 for the XP358 (see graphic, this page).

Lee Rainey, Tektronix manager of product marketing, said the XP350 models have performance rates 65% faster than the company's own 330 series in performance areas, such as general graphics display, terminal emulation, Windows management, X terminal-specific operations and 500-pixel operations.

Also, in-house testing of the same areas indicates that the XP350 performed 49% faster

than Network Computing Devices, Inc.'s 19c X terminal running NCDWare 3.0.1, 64% faster than Hewlett-Packard Co.'s 700/RX running HP's B.0401 software and 82% faster than Digital Equipment Corp.'s VXT 2000 X terminals.

Rainey said the ExpressWare Version 6.2 is required to run the XP350 series at these performance levels because the software is designed to take advantage of the processing speed of the LSI chip.

Peter Snyder, director of marketing and sales at Trident Systems, Inc., a Fairfax, Va.-based reseller of Tektronix's products and beta site for the XP350 series, ran concurrent tests on an XP350 terminal and a DEC VXT 2000 to

measure the reaction times of the terminal's screen painting and mouse and keyboard response. The XP350 finished in less than five seconds, while the DEC unit took 10 minutes.

from interrupting the boot process as defined by the system administrator.

The local print screen options also included in ExpressWare Version 6.2 allow users to integrate desktop-direct printing right on an X terminal within IBM environments. Through IBM 3287 printer emulation included in ExpressWare Version 6.2, Tektronix X terminals can interpret 3287 data streams requests for print jobs and send them to a local or net-

worked ASCII printer. IBM 3270 and 3179G and DEC VT-220 and VT-340 emulators also enable users to access legacy databases from X-terminal-based applications.

ExpressWare Version 6.2 will be available in August and is priced at \$500 for tape and \$650 for CDROM.

©Tektronix: (800) 225-5434.

XP350 Pricing

Product	XP350	XP354	XP356	XP358
Size	N/A	19" gray scale	17" color	19" color
Resolution (in pixels)	N/A	1,280 by 1,024	1,280 by 1,024	1,280 by 1,024
Colors	N/A	256 shades	256 colors	256 colors
Price	\$2,495	\$3,495	\$4,295	\$5,495

N/A = Not applicable

SOURCE: TEKTRONIX, INC., WILSONVILLE, ORE.

GRAPHIC BY TERRI MITCHELL

Rainey, a manager at Tektronix, said that the XP350 models have performance rates 65% faster than the company's own 330 series.

A controller and three desktop models

To take control of your enterprise, you've got to walk some mean streets. Around every corner is another standard, another legacy system to be integrated with your corporate IS management strategy.

But now you can apply the power of client/server technology and finally take control of the

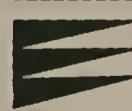
management functions for all your hardware, software, hosts, minis and networks—regardless of the brand. Whether DEC, SynOptics, IBM, Tandem or any other, COMMAND/Post lets you manage every one of your systems *from a single workstation*.



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And if you have adopted standards such as Hewlett-Packard's OpenView, Boole & Babbage's MainView, or others, COMMAND/Post will extend your control to every corner of the enterprise.

So find out more about the only true single-point enterprise management and automation system available, and avoid going down any blind alleys. Call Shawn Walker at 1-800-544-2152 and ask for the Enterprise Automation White Paper.



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With this explosive growth comes the need for network management systems to simplify management operations. The SNMP (Simple Network Management Protocol) has rapidly become the de facto standard for these management systems.

In this information packed one-day seminar, you will acquire a thorough understanding of the elements of an SNMP-based network management system, how to implement SNMP with your internetwork, plus the various enhancements such as the new message formats, improved error codes and security with SNMP version 2.

A special feature of this seminar are case studies, taken from live networks, and demonstrated with a Network General Sniffer® protocol analyzer.

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10/15/93	Seattle, WA
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10/20/93	Atlanta, GA
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- Survey the key elements of Abstract Syntax Notation One (ASN.1), the language used to define SNMP message formats.
- Understand how TCP/IP and the related Internet protocols such as UDP and IP support SNMP.
- Learn how test equipment that supports the Remote Monitoring (RMON) MIB can assist with distributed LAN management.
- Understand the enhancements found in SNMPv2, such as Manager-to-Manager communications, the GetBulk Protocol Data Unit, and enhanced Security.
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MANAGING
INTERNETWORKS
WITH SNMP



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faster way
to stay on top
of your
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Pinpoint network problems in seconds.

Ring Beaconing
The ring is beaconing
Override and insert?

Beaconing rings. Push one button, and in seconds the LANMeter will insert into a beaconing ring and automatically identify the fault domain. No more wading through screens of decodes.



Bad connectors. Instantly identifies cable faults all the way down to the connector.

File server not found. These four words can ruin your whole day. Hook-up the LANMeter in Expert-T mode and find out where the problem resides: in the PC, cable or MAU.

Misconfigured stations, bridges, or routers. Buffers too small? Using inefficient routes? Too much traffic to one server? Use the LANMeter's



comprehensive set of network statistics, graphic error and usage analysis, response time testing, plus fault domain reporting of soft errors, broadcasts, and traffic to isolate and

troubleshoot those problems.

Bad or marginal network interface

cards. Attach the LANMeter to a suspect station, run the NIC tests, and LANMeter will verify the NIC's ability to enter a ring. Prevent problems by using this test *before* attaching a new station to an operating ring.

Overloaded server. The LANMeter's pie chart shows you which station is eating up too big a slice of the server.

Duplicate local or remote addresses. Without the LANMeter, this could take hours to isolate. Use the Expert-T or real-time soft-error analysis to solve this problem.

HELP

Too-long cables?

Only the LANMeter *automatically* detects the presence of self-shorting connectors and tells you the correct distance — so you don't have to remember to calculate it yourself.

Station inserts at wrong speed.

Hook-up the LANMeter between a suspect station and MAU. It will tell you the ring speed and station speed. If they don't match, the LANMeter prevents the station from

**RING
ERROR**

bringing down your ring. And, you'll really appreciate this feature: The

LANMeter detects the ring speed and *automatically* inserts at the correct speed so it never brings down your ring.

Noisy cables. In real-time, the LANMeter's soft-error pie chart

points out *where* the problem is in the network. Then, you can use the cable tests to find out *why* it's bad.

Stuck MAU ports. This "headache" can bring down an entire ring. The LANMeter will not only test for this, it'll reset the MAU port and then verify it was fixed.

Slow response time.

Is your LAN too busy? Too many ring errors slowing network throughput? The LANMeter's graphic display lets you immediately see exactly how busy your network is, plus which types and sources of soft errors are bogging down performance.

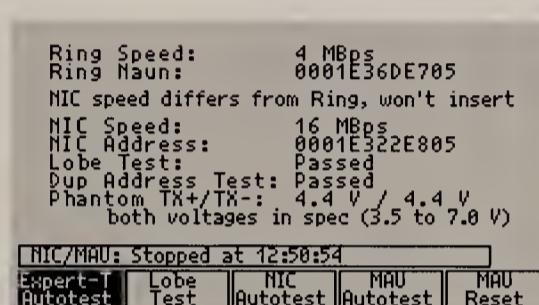
Noisy MAU. This problem most often surfaces as excessive phase jitter. The LANMeter

is the only tool that can measure it.

Excessive broadcast traffic.

The LANMeter instantly identifies

who is sending which kind of broadcast traffic.



Ring Speed: 4 MBps
Ring Maun: 0001E36DE705
NIC speed differs from Ring, won't insert
NIC Speed: 16 MBps
NIC Address: 0001E322E805
Lobe Test: Passed
Dup Address Test: Passed
Phantom TX+/TX-: 4.4 V / 4.4 V
both voltages in spec (3.5 to 7.0 V)
NIC/MAU: Stopped at 12:50:54
Expert-T Autotest Lobe Test NIC Autotest MAU Reset

Ring works at 4 Mbps but not at

16 Mbps. Is there a problem in a single cable or the entire ring? The LANMeter gives you several ways to solve this one. Use the LANMeter to isolate the culprit. Then use the lobe test to determine if that station's

cable is capable of handling 16 Mbps traffic. Or could it be your ring jitter is out of spec?

Only the LANMeter can tell you.

Miswired connectors. The LANMeter's wiremap test will tell you exactly how each cable is wired.

Tools for Healthier LANs

FLUKE

Fluke TOKEN RING LANMeter™



Graphic presentation of test results helps you quickly understand and isolate network problems. Connection diagrams simplify hook-up.

Simple two-level softkey menus put you just a few key strokes away from test results.

LAN-At-A-Glance LEDs let you instantly see the status of your Token Ring network.

Color-coded green, yellow, and red UTILIZATION LEDs convey exactly how busy your network is.

Red BEACON LED alerts you to beaconing, while the on-screen Beacon Pop-up window displays the fault domain in plain English.

RING ERROR LED instantly flags errors that affect Token Ring performance.

WIRE FAULT LED lights to point out faulty connection to MAU.

RING SPEED is automatically determined, lighting either the 4 Mbps or 16 Mbps LED.

Shown Actual Size
29.2 cm (H) X 16.3 cm (W) X 5.6 cm (D)
(11.5 in. (H) X 6.5 in. (W) X 2.2 in. (D))



No more searching for "special" adapters. The LANMeter has built-in RJ45 and DB-9 connectors for quick connections to Type 1 and Type 3 cabling systems.

Get integrated cable and network measurements with one tool.

Test your network by connecting the LANMeter to your ring like you would any other station ... or connect the LANMeter between a suspect station and the network and it will automatically isolate a problem to the station, cabling, or network.

Extensive context sensitive **HELP** text includes troubleshooting advice.

Attach the LANMeter to a printer and press **PRINT** for a hard copy of your test results.

"Flash ROM" technology means that as software enhancements become available, you can download new firmware through the serial port in just a few minutes.

LANMeter's Unique Features:

- LAN-At-A-Glance LEDs
- Expert-T Autotest
- Automatic insertion at correct ring speed
- Phase Jitter Measurements
- Real-Time Graphic Analysis
- Simultaneous Key Measurements (stats, stations, errors)
- "No Dead Zone" TDR Measurements
- NIC/MAU Tests
- Automatic Identification of New and Missing Stations

Get all the cable measurements you need for troubleshooting and maintenance.

The Fluke LANMeter gives you the most-used functions of protocol analyzers - without the learning curve.

Table Scan					
Table type: Type 3 (UIP) Lvl 3					
Cable length: 41 feet					
Expected cable impedance: 100					
TX lead impedance: 138 ohms					
RX lead impedance: 137 ohms					
Suspected split pair on TX and RX leads at connector.					
Table: Stopped at 15:21:17					
More					
Util	17	15	49	Ave	Max
Soft	0	4	211	533	Total
Errs	0	0	0	0	0
(fr/s)	0	0	0	0	0
Beacons	0	0	2	4	4
Claims	0	0	4	11	11
Purges	0	0	6	54	54
Discards	0	0	6	6	6
Stations	5	4	6	6	6
Network Stats	0	0	0	0	0
Error Stats	0	0	0	0	0
Ring Stations	0	0	0	0	0
More	0	0	0	0	0

Table Scan					
Table type: Type 3 (UIP) Lvl 3					
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Purges	0	0	6	54	54
Discards	0	0	6	6	6
Stations	5	4	6	6	6
Network Stats	0	0	0	0	0
Error Stats	0	0	0	0	0
Ring Stations	0	0	0	0	0
More	0	0	0	0	0

By combining these capabilities, the Fluke LANMeter is the one tool for the vast majority of your troubleshooting needs.

Get a grip on network problems instantly.

The handheld, battery-powered LANMeter goes directly to where there's a problem, not just where there's an electrical outlet. Fluke's compact, self-contained LANMeter automatically points you to a Token Ring fault — whether it's in your software, cabling, network interface, configuration, or PC. Even on sick or dead networks. All without programming, setting filters, or decoding complex protocols. It performs in seconds and only takes 30 minutes to learn.

Simply grab it and go, avoiding time-consuming tests with multiple tools. The LANMeter's real value is not just helping you quickly *react* to problems but instead helping you proactively *maintain* a healthier network. Insert it into your ring to find out where efficiency is bogging down. And head off problems *before* they happen. When a problem does occur, the LANMeter's graphic display makes it easy to visualize exactly where it is. So you can take immediate action to correct it.

Get more performance out of your network by getting your hands on the tool with more features for less than *one-third* the price of a dedicated protocol analyzer. The new LANMeter from Fluke.

Call today for a revealing on-site demo and our FREE pocket guide to Token Ring healthcare. Phone numbers listed on back.

Tools for Healthier LANs

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Simply call for an
"eye-opening"
demo of the
LANMeter in
action and our
special Pocket Guide.

Learn handy pointers on how you can use the LANMeter to improve the health of your Token Ring network:

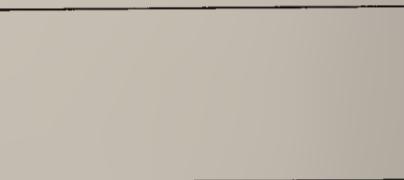
- where to start, and how to proceed in identifying trouble spots in your Token Ring network
- what network statistics are important for creating a baseline network evaluation
- how to obtain those statistics using the LANMeter
- how to verify node connectivity and configuration *before* your network is affected
- detailed troubleshooting chart of 13 common isolating and non-isolating token ring errors. Each error is broken-down by:
 - when the error is normally generated
 - when the error should cause alarm
 - what usually causes this type of error
 - where to look for the source of the problem
- technical description of various cable measurements and how they apply to LAN cabling, plus a glossary of LAN terms.

John Fluke Mfg. Co., Inc.

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Everett, WA 98206

T&M Dept., Building TQIII-4
5600 MD Eindhoven, The Netherlands
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Apple

Continued from page 18

And that "is a different market than Ma and Pa organizations."

But Hartsook cautioned that the ultimate effects of the reorganization "will depend more on what support and product management programs are in place and less on the organizational matrix in which they sit. Net managers don't care who their salesman reports to; they want someone on the other end of the line when they need someone."

Bryan Toney, president and CEO of Information Management, Inc., an Apple systems integrator in Decatur, Ga., predicted that the moves would make Apple even more dependent on third parties to sell

Apple's new organization

Personal Computer Division	Ian Diery, executive vice president
AppleSoft	David Nagel, senior vice president
Personal Interactive Electronics Division	Gaston Bastiaens, vice president
Claris Corp.	Daniel Eilers, president and CEO
Apple Business Systems Division	Morris Taradalsky, vice president

products. While details of the new organization are still being determined, the broad outline has been set.

The ABS, which is headed by Morris Taradalsky, who also led the ESD, joins four

other business units.

The new Personal Computer Division, which takes over from the Macintosh Systems Division, is headed by Ian Diery, newly promoted to executive vice president. Senior Vice President David Nagel will run AppleSoft, previously called the Macintosh Software Architecture Division.

Vice President Gaston Bastiaens continues to lead the Personal Interactive Electronics Division, which is developing Newton, while Daniel Eilers stays on as president and CEO of Claris Corp., Apple's application software subsidiary.

The new ABS, which suffered an undisclosed number of layoffs, will be divided into four key areas:

■ LAN Based Systems will include the Apple Workgroup Servers, services such as AppleShare and AppleSearch, the AppleTalk Internet Router, AppleTalk Remote Access and the IBM alliance products.

■ Connectivity Hardware will cover Ethernet and token-ring cards, connectors and cabling.

■ Open Systems Software will handle Apple's efforts to put the Macintosh on Unix and PowerOpen products.

■ Enterprise Technologies will be responsible for Virtually Integrated Technical Architecture Lifecycle (VITAL), Apple's vendor-independent information systems architecture, as well as the company's relationship with Taligent, Inc., its operating system joint venture with IBM.

Responsibilities for a number of products formerly under the ESD umbrella have shifted to other units, however. According to the company, if a product was not directly providing revenue to the group, it was handed over to another unit, where it would be more closely aligned with related products and hopefully generate revenue.

AppleTalk Connectivity for Macintosh, TCP/IP Connectivity for Macintosh and OSI Connectivity for Macintosh, as well as X.25 and X.400 products, for example, were moved to AppleSoft.

Responsibility for the basic AppleTalk protocol architecture is still being delegated, but some elements will stay within ABS while others will go to AppleSoft, a company spokesman said.

IS tools have been given to Apple's developer relations program and to core evangelism efforts within AppleSoft.

As a leaner organization, ABS will attempt to add value by bundling products to create complete solutions, the spokesman said.

While Apple claims to remain committed to VITAL, observers said the changes at ESD could shake users' faith.

"Apple seemed to have some momentum going with VITAL," said Strategic Networks' Morency. With the cuts, however, Morency wondered about the company's ability to support that momentum.

"Lots of major customers really need hand-holding on that stuff," he warned. Downsizing could affect Apple's ability to "help customers understand and map new technology into large Macintosh nets." □

CDROM

Continued from page 18

ian to change or update CDROM discs. If the drive must be located in a locked network center, the already busy network administrator would be saddled with the job.

Microtest's Diskview access software makes it easy for these librarians to manage the CDROM from any workstation on the network that has privileges to the drive. Current CDROM software requires users to go to the server or invoke supervisor privileges in order to manage the drive.

According to Wilkinson, Discport is targeted primarily at organizations that have not yet networked their CDROM drives because they believed that the job was too complex. Microtest's approach lets users quickly install new Discports without bringing down the network. Some other solutions require users to shut down the LAN in order to attach and configure a new Small Computer System Interface (SCSI) card to the server, Wilkinson said.

Discport consists of server software and a small box about the size of a VHS videotape, with a SCSI connector at one end that attaches to as many as seven CDROM drives, while the network link on the other end can be either a BNC or 10Base-T connection.

Discport is scheduled to ship in August for \$695, including software licenses for an unlimited number of users.

Once the initial version ships, Microtest will consider versions for other types of networks, Wilkinson said. He named Transmission Control Protocol/Internet Protocol, Windows for Workgroups and Windows NT as possibilities. The company is also pursuing various Macintosh and AppleTalk options, he added.

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SPREADING THE WORD



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Over the years, SETA has become the regional trade show by which all other trade shows are judged. Each year over 1800 SETA members and guests gather at the Annual Conference and Equipment Exposition to share information, attend education seminars and view exhibits. This year's SETA Conference will be held August 30 through September 1, at the Opryland Hotel in Nashville, Tennessee. Come meet the SETA members, see and learn about the technology, and experience the quality others will try to match!

For additional information on how you can become part of the 1993 SETA Conference and Equipment Exposition, or about joining SETA contact:

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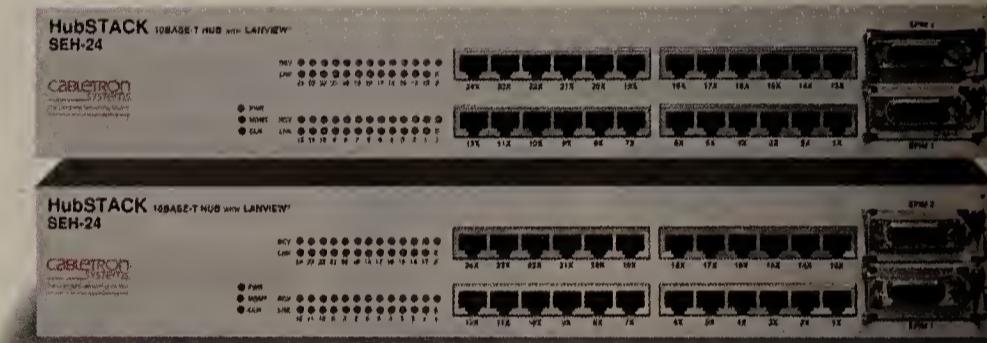
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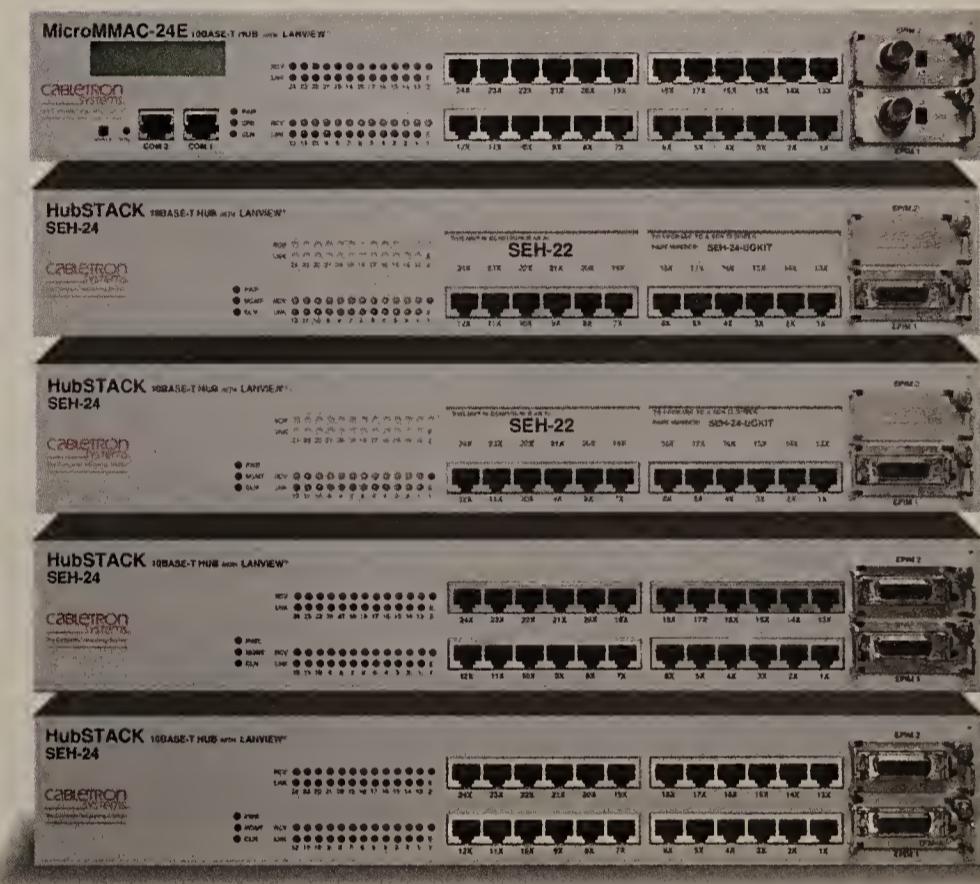
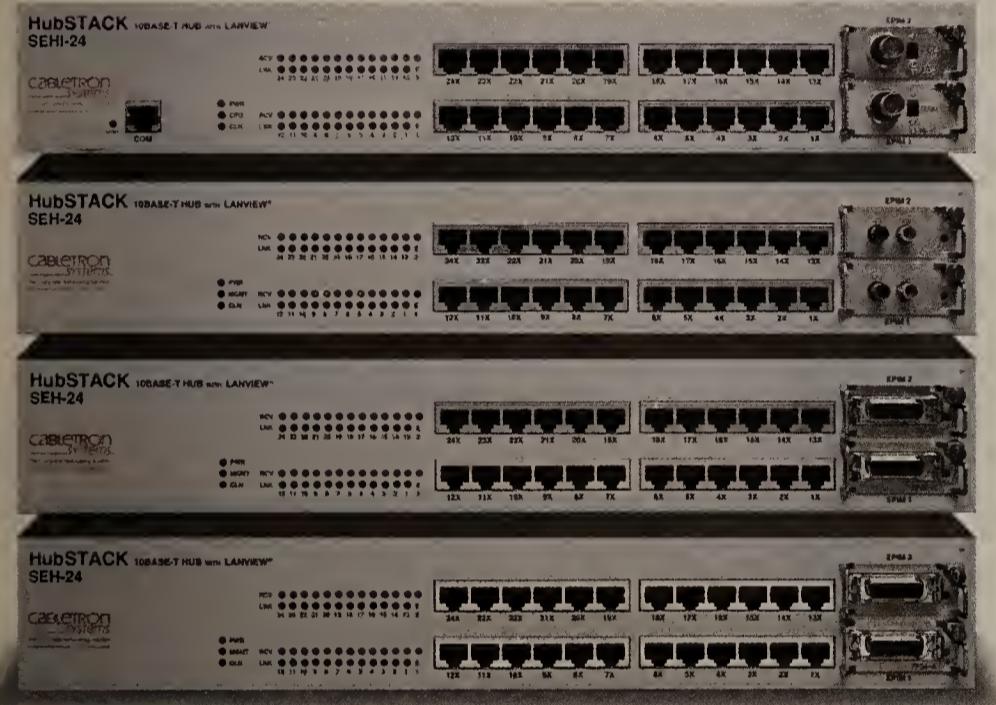
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If you need more ports, choose our SEH-24, or upgrade your SEH-22 with a user-installable field upgrade kit... and instantly double your port density. Growing out of that solution? Don't worry. SEH stands for **Stackable** Ethernet Hub. When more ports are needed, simply stack on another hub. A total of five hubs can be stacked together to create a single, 130-port Ethernet network with only one repeater hop.

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When it's time to connect workgroups together, join remote sites to the corporate office, or create high-

Incredible

bandwidth backbones, simply plug in one of Cabletron's new Bridge Router Interface Modules (BRIM) for in-the-hub bridge/routing on Ethernet, token ring, FDDI, ATM, or wide area networks. These **incredible** modules feature all the functionality of a standalone device without the heft... or hefty price tag. And because it resides in the hub, the BRIM and the hub are viewed as a single entity by your management system for simple, seamless management.



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office may have been without power,

checks on a continual basis. This lets



land-speed records. The storm

we were still able to assemble our

At ROLM, we're always there

brought down over 120 customer

entire ROLM

for you. Through

phone systems. Within 36 hours,

service team.

rain, or snow, or

most were back up.

In addition,

sleet, or flood, or

Our secret? A flexible service

we have four

hurricane, or

and support structure that lets us

national service centers around the

earthquake, or locust plague, or...

react quickly to any given situation.

country backing each other up. If one

Every ROLM office has a disaster

goes down, we simply reroute all

contingency plan. So though our

service calls to the other three.



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GLOBAL SERVICES

Voice, Data and Wireless Services, Regulatory Issues and Voice CPE

Proposed basic business rates



Two California judges, George Amaroli and Evelyn Lee, and California Public Utilities Commission (PUC) member Norman Shumway, have proposed separate plans for revamping the state's business telephone rates.

SOURCE: CALIFORNIA PUC, SAN FRANCISCO GRAPHIC BY SUSAN J. CHAMPEY

California PUC considers local toll competition

BY BILL BURCH

San Francisco

Come the first of the year, California businesses could be paying around 40% less for toll calls in their local area but shell out as much as 50% more for private lines.

The changes are part of a proposal the California Public Utilities Commission (PUC) is considering in order to introduce competition for intra-local access and transport area toll service. The plan calls for cutting intra-LATA toll rates while raising long-subsidized basic rate charges on Jan. 1.

The proposal is part of a nationwide trend to cut phone rates by introducing competition in the local loop. In California, the state's almost \$3 billion in intra-LATA toll revenues has led more than 100 potential competitors to ask for permission to provide the service. AT&T, MCI Communications Corp. and Sprint Corp. have all filed to provide the short-haul service, which would carry local phone calls subject to tolls.

Under the intra-LATA plan, every California caller phoning within the state beyond a 12-mile radius, or a 16-mile radius in some areas, would be free to choose a local toll carrier. If the caller did not dial an access code, the local phone company would handle the call as it does now.

The plan was laid out July 16 by California Judges George Amaroli and Evelyn Lee and supplemented by comments from California PUC member Norman Shumway.

In their review of the state's telecommunications services, the judges concluded that California would benefit from intra-LATA toll competition and proposed that the PUC allow long-distance carriers to compete for intra-LATA toll business come Jan. 1. They endorsed limited local toll competition and a new telephone rate design.

Shumway went further than the judges and suggested competition should also be introduced for such services as analog private lines and directory assistance. Shumway has been serving as the commissioner assigned to the case for the PUC.

For the business customer, how the new rates shape up will depend on the mix of calling services used. Although a business might benefit from lower intra-LATA tolls, private-line prices are expected to go

See California, page 83

Nynex to decrease rates for contingency planning services

Price of being prepared drops 50% to 60%.

BY BILL BURCH

New York

Learning a lesson from the flood that shut down businesses in three Midwestern states, network administrators may pay added attention to New York Telephone Co. this fall when it offers backup network services at 50% to 60% off the full tariffed rate.

New York Telephone's Crisis Management Service allows businesses to have a backup network in place that can be brought up in an hour or two but without requiring them to pay full price for bandwidth that often sits idle.

The service could decrease the appeal of competitive access providers, such as Teleport Communications Group, Inc., which have typically pitched their offerings as a backstop to telephone company network failures.

New York Telephone's new standby service contrasts with more traditional emergency planning approaches.

Pacific Bell, for example, works with cus-

tomers to develop contingency plans for disasters.

That lets users avoid the expense of provisioning a backup network but does not offer the rapid restoration times when disaster strikes.

With New York Telephone's Crisis Management Service, users can set up a standby network before a disaster occurs.

Although the company will exercise all due alacrity in restoring service for customers without contingency plans, their networks could take a full day or longer to bring back up, said Dennis Rohan, a staff director for private-line product management with Nynex's Telesector Resources Group, Inc.

Virtually any of the company's offerings can be used in its Crisis Management Service, such as standby T-1 lines that can provide alternate routes into a building and routing of circuits to alternate business sites.

The Federal Communications Commission gave Nynex Corp., New York Telephone's parent company, approval for the disaster recovery service on July 13. Now the company must wait until a New York state tariff takes effect on Aug. 6 before it can offer the service. New England Telephone, New York Telephone's sister company, may decide to offer the service, as well, Rohan said.

New York Telephone's service will be



Aftermath of World Trade Center bombing

priced on an individual-case basis, with customers paying recurring monthly charges for a set of standby services. Then if a disaster should strike, customers would pay a charge for each day the services are required. Service activation charges would also apply.

See Nynex, page 83

BRIEFS

A hot line for information about Computer-Telephone Integration (CTI) has been established by the industry group Alliance of Computer-Based Telephony Application Suppliers (ACTAS), which is part of the North American Telecommunications Association. By calling (800) 428-4463, end users and suppliers can get immediate access to an ACTAS representative, who will put them in touch with companies in the CTI business. Callers also get the CTI Business Solutions Catalog free of charge.

The European Telecommunications Standards Institute general assembly voted in support of a resolution that requires all members to sign the new intellectual property rights (IPR) policy agreement or lose membership status (NW, May 17, page 29). The general assembly voted to require prospective members to sign the IPR agreement, as well.

Metropolitan Fiber Systems of New Jersey, Inc. has signed an agreement with MH Lightnet, Inc. to jointly construct a 117-route-mile fiber cable that will serve as an extension to MFS' existing 23-route-mile northern New Jersey net. The new route will serve users in more than 80 buildings in Fairfield, Morristown, Newark, Secaucus, West Orange and Whippany, N.J.

Sprint Corp. has signed contracts worth \$1.7 million over three years to provide frame relay service to 65 Source One Mortgage Services Corp. locations. The carrier will also supply customer-service automation equipment and services through Sprint Telemedia. Source One has been a virtual private network and 800 services customer with Sprint for seven years.

AT&T has signed a four-year, \$9 million contract with Apogee Enterprises, Inc. to build a Global Software-Defined Network for voice and data that will link 350 Apogee locations in the U.S., the U.K. and Singapore. The carrier will also provide domestic and international 800 services to Apogee, a glass and aluminum manufacturer.

See Briefs, page 83

MCI to follow Sprint lead with Internet directory

Expect MCI Communications Corp. to soon follow Sprint Corp.'s example and offer a directory of Internet users so its MCI Mail customers can route messages more easily to parties on the Internet.

That is the word from Paul Weichselbaum, MCI's vice president of data marketing. In an interview covering a wide range of topics earlier this month, Weichselbaum mapped out new value-added services MCI aims to provide, expounded on the merging of MCI and BT North America, Inc. and discussed the company's plans for packet services, such as Switched Multi-megabit Data Services (SMDS) and Asynchronous Transfer Mode (ATM).

With MCI's large base of electronic mail customers, a directory that would provide Internet addresses worldwide is a natural. Such a directory would counter a similar directory service offered by Sprint as part of a larger set of commercial Internet offerings the carrier is reselling (NW, June 28, page 27). An MCI directory would also boost the appeal of the Internet gateway it brought on-line late last year.

Along with an Internet directory, MCI wants to try its hand at protocol conversion services, Weichselbaum said. Such services would allow frame relay users to talk to SMDS users by handling protocol conversion and network addressing differences, for example.

"You start to get into logical services where the net... See MCI, page 83



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NETWORK EQUIPMENT TECHNOLOGIES



Elsevier pioneers age of electronic book distribution

BY ELLEN MESSMER

Washington, D.C.

The future role of digital libraries and networked distribution of books and information was the subject of debate at the recent Library of Congress forum that brought business and academia together with federal lawmakers.

Chaired by Vice President Al Gore, the day-long forum took shape as an open market for the exchange of ideas on the barriers and opportunities associated with networked delivery of publications.

While the barriers — copyright concerns and technical costs — appear high to many,

Elsevier Science Publisher sees the opportunities, as evidenced by its recently launched electronic journal distribution service.

At the Library of Congress forum, Gore noted that legal and policy issues are at least as formidable as technical barriers to the creation of the National Information Infrastructure proposed by the White House.

"It's now appropriate to address the many thorny policy and legal questions," Gore said to the forum's participants, which included approximately 40 representatives from business, government and academia.

"How do you protect copyright in a net-

worked environment?" the vice president asked. "I'm convinced new approaches are needed, and the people in this room are the ones to help."

For several years, university libraries have asked publishers to make their books available in digital format so that readers could access them over the network. Despite the desire to reach networked readers, publishers have remained cool to digital distribution.

Having already fought some tough legal battles over illegal photocopying, publishers are wary of the prospect of rampant copyright violations with electronic books, which can be duplicated with the touch of a keyboard.

But one of the world's largest sellers of scholarly publications, Elsevier Science Publishers, is ready to prove that everyone can win when books are distributed over a network.

Elsevier's first venture in networked books, dubbed The University Licensing Project (TULIP), is set to roll this September, with a dozen universities participating.

Elsevier has successfully concluded a site-licensing agreement under which it will distribute about 40 engineering and materials research journals over the Internet to certain schools.

"The server site in New Jersey is sending engineering journals in a onetime batch to the other servers," said Karen Hunter, vice president and assistant to the chairman at Elsevier.

Under the plan, Hoboken, N.J.-based Information Engineering, Inc. will distribute Elsevier's electronic files of the journals to the universities. But the universities must have high-speed nets to handle the TULIP electronic journals, Hunter noted.

The fundamental subscription-based model agreement used by Elsevier lets each subscribing university obtain electronic versions over the Internet for free. Students on campus can check out volumes electronically over the university's net, but each university is expected to let students know that electronic books cannot be passed along off-campus.

"The copyright issues at the level we're talking about can be resolved," Hunter emphasized. "But the dream of access from all locations — that's very different."

Making electronic books available to everyone on a dial-up basis raises some tough legal problems because publishers do not necessarily hold all the rights to a specific work. "It's something that's complicated," Hunter said.

"We can't have a digital library until we solve the copyright problem," said Peter Lyman, dean of the university libraries at the University of Southern California. "And we have no idea how to license information in a networked environment."

Some publishers have suggested that colleges pay by the user, which is expensive, Lyman said.

At the forum, some questioned what the role of the library would be in this new world where books will be available on-line.

"I see multiple libraries coming into existence that are in competition with the traditional library; they're commercial libraries like NEXIS/LEXIS," said Jerry Berman, executive director of the Electronic Frontier Foundation public interest group. "If you become an on-line distribution function for the masses, you are not the corner library anymore, but a major mass-distribution system."

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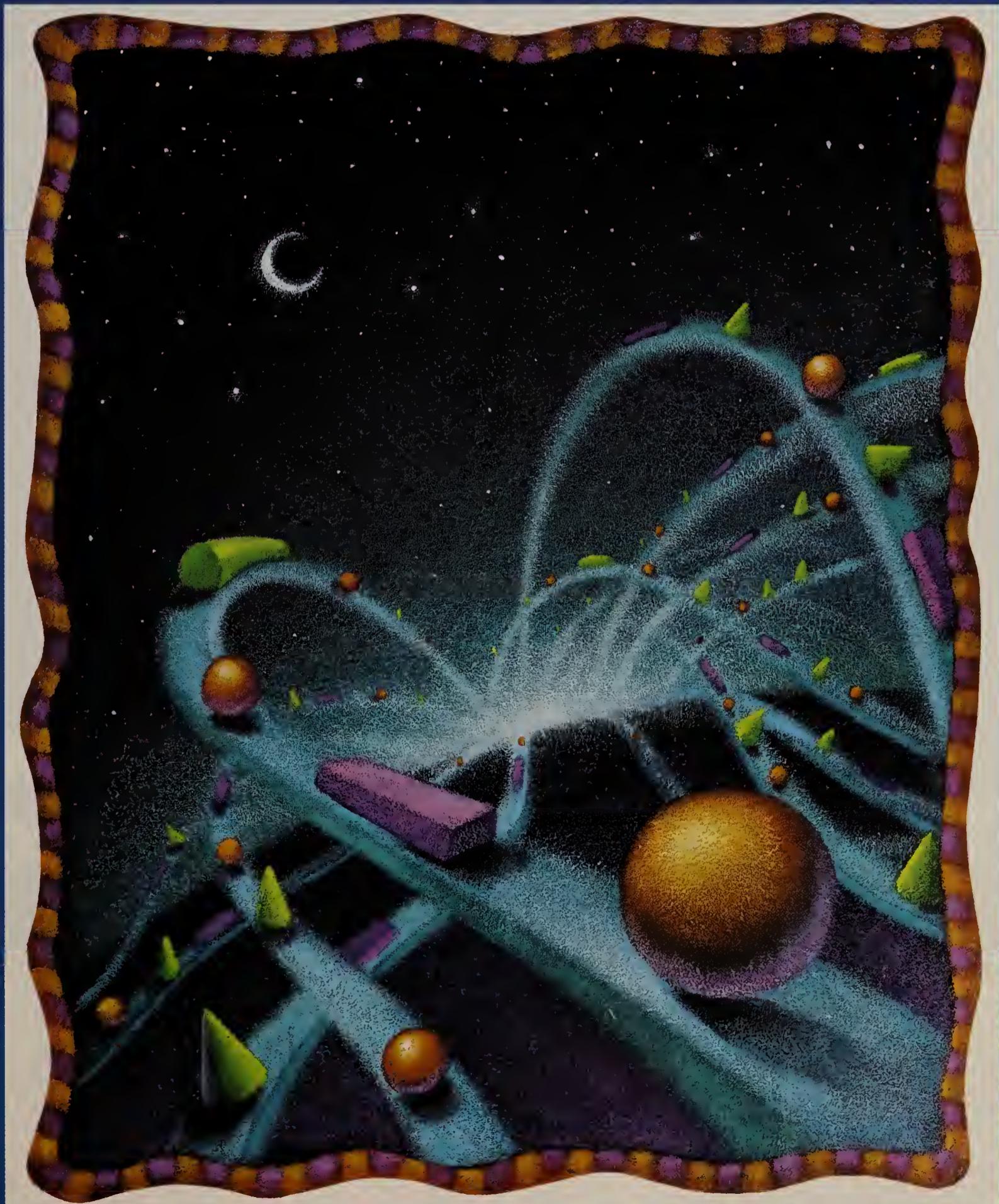
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examination
of emerging
products,
services and
technologies
—∞—*



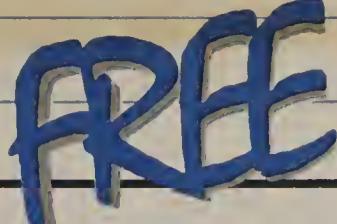


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1 Industry: (check one only)

- 01. Manufacturers (other than Computer/Communications)
- 02. Finance/Banking
- 03. Insurance
- 04. Real Estate
- 05. Healthcare Services
- 06. Legal
- 07. Hospitality
- 08. Retail/Wholesale Trade/Business Services
- 09. Transportation
- 10. Utilities
- 11. Education
- 12. Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
- 13. Government, State/Local
- 14. Government, Federal
- 15. Military
- 16. Aerospace
- 17. Consultants (Independent)
- 18. Carriers
- 19. Interconnects
- 20. Manufacturers (Computer/Communications)
- 21. VAR/VAD/VAN/ Systems Houses
- 22. Distributors, Computer Related
- 23. Distributors, Communications Related
- 24. Other

2 What is your job function? (check one only)

NETWORK MANAGEMENT

- 1. Networking Mgmt. 3. Datacom/Telecom Mgmt.
- 2. LAN Mgmt. 4. Engineering Mgmt.

MIS MANAGEMENT

- 5. MIS, IS, IT Mgmt. 6. Engineering Mgmt.

CORPORATE MANAGEMENT

- 7. Corporate Mgmt. (CIO, CEO, Pres., VP, Dir., Mgr., Financial Mgmt.)

- 8. Consultant (Independent)

- 9. Other

3 My responsibilities include: (check one only)

- 1. LANs/ Internetworking/ WANs 3. LANs 5. None
- 2. LANs/ Internetworking 4. WANs

4 What is the total number of sites for which you have purchase influence? (check one only)

- 1. 100+ 3. 20 - 49 5. 2 - 9. 7. None
- 2. 50 - 99 4. 10 - 19 6. 1

5 What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. Scope (check one only)	B. Involvement (check all that apply)
1. <input type="checkbox"/> Corporatewide	1. <input type="checkbox"/> Recommend/Specify
2. <input type="checkbox"/> Multienterprise (consultants)	2. <input type="checkbox"/> Approve
3. <input type="checkbox"/> Departmental	3. <input type="checkbox"/> Evaluate
4. <input type="checkbox"/> None (A or B)	

6 Check all that apply in Columns A and B:

A. I am involved in the purchase of the following products/services.

B. I plan to purchase the following products/services in the next year.

Plan to Purchase

A	B	LOCAL-AREA NETWORKS
<input type="checkbox"/> 01. <input type="checkbox"/> Local-Area Networks		
<input type="checkbox"/> 02. <input type="checkbox"/> LAN Servers		
<input type="checkbox"/> 03. <input type="checkbox"/> LAN Operating Systems Software		
<input type="checkbox"/> 04. <input type="checkbox"/> Superservers		
<input type="checkbox"/> 05. <input type="checkbox"/> Data Base Servers (Oracle, Sybase, etc.)		
<input type="checkbox"/> 06. <input type="checkbox"/> Terminal Servers		
<input type="checkbox"/> 07. <input type="checkbox"/> LAN Services		
<input type="checkbox"/> 08. <input type="checkbox"/> LAN Storage Devices (optical, tape, disk, etc., including backup systems)		
<input type="checkbox"/> 09. <input type="checkbox"/> Network Test Equipment		
<input type="checkbox"/> 10. <input type="checkbox"/> Hubs		
<input type="checkbox"/> 11. <input type="checkbox"/> Cables, Connectors, Baluns		
<input type="checkbox"/> 12. <input type="checkbox"/> UPS		
<input type="checkbox"/> 13. <input type="checkbox"/> Network Adapter Boards		
<input type="checkbox"/> 14. <input type="checkbox"/> Peer-to-Peer LANs		
<input type="checkbox"/> 15. <input type="checkbox"/> Wireless LANs		
<input type="checkbox"/> 16. <input type="checkbox"/> SNMP Network Management		
<input type="checkbox"/> 17. <input type="checkbox"/> ATM (Asynchronous Transfer Mode)		

A B INTERNETWORKING

- 18. Bridges
- 19. Routers
- 20. Gateways
- 21. Bridge/Routers
- 22. Hubs
- 23. Intelligent Hubs
- 24. Communications Servers

Involved Purchase

A B COMPUTERS/PERIPHERALS

- 25. Micros/PCs
- 26. Minis
- 27. Mainframe
- 28. Pen-Based
- 29. Laptops
- 30. Workstations
- 31. Image Processing Workstations
- 32. Front-End Processors
- 33. Terminals
- 34. Printers
- 35. Cluster Controllers
- 36. Fax Machines
- 37. X-Terminals

A B SOFTWARE/APPLICATIONS

- 38. Network Management
- 39. Micro to Mainframe
- 40. Security
- 41. Communication/Terminal Emulation
- 42. Word Processing
- 43. Operating Systems
- 44. Business Applications (Finance/Mfg/HR)
- 45. Applications Development
- 46. Data Base Management
- 47. Spreadsheet
- 48. Groupware
- 49. EDI
- 50. E-Mail
- 51. Windows/Graphical User Interface
- 52. 4GL/Development
- 53. Multimedia
- 54. Graphics
- 55. Utilities

A B WIDE-AREA NETWORK EQUIPMENT/SERVICES

- 56. Modems (9.6K bps and over)
- 57. Modems (under 9.6K bps)
- 58. T-1
- 59. T-3
- 60. Fractional T-1
- 61. Data Switches
- 62. SMDS
- 63. ATM (Asynchronous Transfer Mode)
- 64. Matrix Switches
- 65. Packet Switches
- 66. Protocol Converters
- 67. Diagnostic/Test Equipment
- 68. DSU/CSUs
- 69. Microwave
- 70. Fax Boards/Modems
- 71. VSAT
- 72. Fiber Optic
- 73. Satellite
- 74. ISDN
- 75. PBXs (over 1000 lines)
- 76. PBXs (under 1000 lines)
- 77. Automatic Call Distributors
- 78. Voice Messaging Systems
- 79. Videoconferencing Systems
- 80. Voice Response/Processing
- 81. Switched Voice
- 82. Dedicated Leased Line
- 83. Switched Data
- 84. Centrex
- 85. E-Mail/On-Line Information
- 86. Image Processing
- 87. Audio Teleconferencing
- 88. Local Services
- 89. WATS MTs
- 90. International
- 91. Virtual Networks
- 92. Frame Relay
- 93. Value Added Services
- 94. None of the above (1-93)

7 What is the total number of A: LANs B: Workstations/Nodes in your entire organization?

LANs

A	B
1. <input type="checkbox"/> 5,000+	<input type="checkbox"/>
2. <input type="checkbox"/> 1,000 - 4,999	<input type="checkbox"/>
3. <input type="checkbox"/> 100 - 999	<input type="checkbox"/>
4. <input type="checkbox"/> 50 - 99	<input type="checkbox"/>
5. <input type="checkbox"/> 10 - 49	<input type="checkbox"/>
6. <input type="checkbox"/> 9 or Less	<input type="checkbox"/>

8 Which of the following network platforms are currently installed/planned in the next year?

NETWORK ARCHITECTURES

Present Planned

- 01. SNA
- 02. DECNET
- 03. MAP/TOP
- 04. TCP/IP
- 05. DCA (Unisys)
- 06. X.25

Present Planned

- 07. NOVELL IPX/SPX
- 08. APPC/APPN/LU 6.2
- 09. NETBIOS
- 10. OSI
- 11. APPLETALK
- 12. OTHER

LAN OPERATING SYSTEM

- 13. LOCALTALK (APPLETALK)
- 14. BANYAN (VINES)
- 15. DCA (IRMLAN)
- 16. DCA (10-NET)
- 17. IBM (LAN SERVER)
- 18. IBM (PC LAN PROGRAM)
- 19. MICROSOFT (LAN MANAGER)
- 20. UNGERMANN-BASS (NET/1)
- 21. NOVELL (NETWARE, 2.X, 3.X, 4.X)
- 22. PROTEON (PRONET)
- 23. SITKA (TOPS)
- 24. 3COM (3+, 3+OPEN)
- 25. ARTISOFT (LANTASTIC)
- 26. HAYES (LANSTEP)
- 27. DEC (PATHWORKS)
- 28. OTHER

LAN ENVIRONMENT

- 29. 4M TOKEN RING
- 30. 16M TOKEN RING
- 31. ARCCNET
- 32. ETHERNET
- 33. STARLAN
- 34. FDDI
- 35. LOCALTALK
- 36. 10BASE-T
- 37. OTHER

OPERATING SYSTEM

- 38. DOS
- 39. UNIX/XENIX/AIX
- 40. OS/2
- 41. OS/2 2.X
- 42. MVS
- 43. VM
- 44. VMS
- 45. MACINTOSH
- 46. WINDOWS
- 47. WINDOWS NT
- 48. X WINDOWS
- 49. OTHER

9 For which areas outside of the U.S. do you have purchase influence? (check all that apply)

- 1. Europe 4. Australia
- 2. Asia 5. Middle East
- 3. South America 6. None

10 Which of the following hardware platforms is installed/planned in your company? (check all that apply)

	Mainframes	Planned	Minis	Planned
	Currently Installed	Next Year	Currently Installed	Next Year

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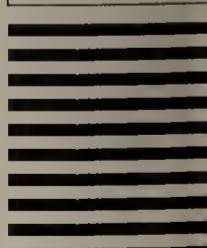
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2 Taking aim at integrated directory services

While a variety of new wares offer improvements, directory services still have far to go before they truly ease the task of distributed computing.



6 Building enterprise internetworks

In networking, as in life, change is the only sure thing. Such is the case in internetworking as network operating systems continue to advance in functionality.

10 Serving up multimedia



Vendors and industry groups tackle the problem of adding video, audio and image to today's data-intensive network servers.

17 Putting the ether back in Ethernet

As wireless technologies for voice and data come to the fore, users need to sift through the technology options.



23 Playing the right cards

The latest vendor software distribution and licensing strategies promise users a whole new game.

30 The file cabinet of the future

Today's document and image processing systems are cheaper and easier to use, but several roadblocks remain before users can usher in the totally paperless office.

34 Slow progress on high-speed communications

ATM, FDDI and fast Ethernet all offer partial solutions, but none is a clear winner in the high-speed LAN race.



39 Fast forward to LAN-based video

Products from Fluent, ProtoCom and Starlight offer users the first step to full-motion, video LAN capability.



44 Interop: Cultivating the leading edge

President Daniel Lynch gives users a glimpse into the future of Interop, and discusses the highlights of this year's show.



48 Researching for the future

Interviews with researchers at leading institutions who are working on groupware projects show how the emerging technology may play in your future.



52 Easing communications

A look at how Cravens, Dargan & Co. improved the intercompany communications using electronic mail.



Taking aim at integrated

BY GARY ROWE

Integrated directories are the road maps that promise to help users navigate an increasingly complex web of electronic mail services, network environments and distributed systems resources. But while directory technology has moved decidedly forward during the past year, a good deal needs to be done to make the promise a reality.

The need for integrated directory services is growing as users connect formerly isolated E-mail and local-area network communities. But selecting the best directory solution in a volatile technology market is a difficult process for network managers. It requires an understanding of key directory concepts, industry trends, products and future technology directions.

Directory services allow users of such network services as E-mail or LAN operating systems to get information about

objects, including people, applications and resources such as printers and hosts. Directories support such applications as network address lookup and yellow-pages services, and play a critical role in the administration of complex networks.

Offerings from network and E-mail vendors fall into one of three categories: proprietary directories supporting a single environment; X.500-based directories; and hybrid X.500-like directories.

The most common directory forms are those supporting a single-vendor environment. They may support a specific E-mail environment, such as Lotus Development Corp.'s cc:Mail or a LAN operating system such as Novell, Inc.'s NetWare.

The problem is that most large organizations support multiple network and E-mail services, leaving users with the difficult chore of integrating multiple proprietary directories. Integration is only partially supported by directory synchronization tools.

In much the same way that a gateway provides connectivity between incompatible systems, directory synchronization tools foster compatibility among proprietary directories. They collect information from different directories, reformat the data and ship updated information to each directory.

Directory synchronization allows entries from foreign directories to be collected, updated and displayed within a local directory service. Synchronization would, for example, allow a cc:Mail user to obtain information about an IBM Professional Office System (PROFS) user from the local cc:Mail directory.

Hoping for salvation

X.500 is the long-promised salvation for network users and administrators. It is based on the joint CCITT and ISO standard.

The X.500 specification defines a hierarchical tree structure that is intended to support global services extending across organizational and geographical boundaries. The corresponding complexity, however, has resulted in limited availability of X.500 products.

The initial version of X.500, based on the 1988 specification, lacks sophisticated access control, administrative extensions, management facilities, replication and knowledge-sharing capabilities.

Access control is critical in cases where the directory stores proprietary information. In fact, the absence of robust security and access control features

has been an inhibitor in establishing global directories.

Knowledge-sharing features enable multiple, cooperating directories to resolve queries that can't be fulfilled locally, while replication allows information to be maintained in multiple locations.

Access control, knowledge-sharing and replication are defined in the 1993 standard, which has been called the 1992 standard but this year will be officially ratified. Products based on this standard should emerge in 1994, although Digital Equipment Corp. claims to support many 1993 X.500 extensions in its new X.500 product.

There is also a new class of products that claim to be based on the X.500 specification but don't actually support the X.500 directory protocols. While these products might ease the eventual migration to X.500, they won't provide for exchange of directory information with real X.500 products.

Vendors will often call these products X.500 or X.500-like, but users should ask if they support the Directory Access Protocol (DAP), which supports access to an X.500 directory, and the Directory System Protocol (DSP), which handles communications among distributed X.500 servers.

What to do?

Should users move to the newer X.500 products or simply use directory synchronization tools to tie together legacy directories? The answer is probably yes to both for many enterprises. Directory synchronization is an immediate necessity for users that need to access information from multiple directories. But the long-term strategy is to embrace directories based on X.500.

Durwin Sharp, E-mail advisor for Exxon Corp., says he plans to use X.500 in the future but doesn't believe it is an immediate answer to the oil company's directory problems.

"We're not all that excited about X.500," he says. "We're not initially looking for a worldwide phone book. Our priority is to manage internal directories across many legacy systems."

Other users such as The Boeing Co., Citicorp and Martin Marietta Corp. are positioning X.500 to support emerging directory infrastructures.

The good news for users is the growing attention being paid to directory technology by vendors. Proprietary directories are being enhanced to offer X.500-like functionality, and real X.500 products are emerging in pilot and beta-test environments.

Products such as Banyan Systems, Inc.'s StreetTalk III and Enterprise Network Services (ENS), DEC's Digital Directory Services (DDS) and Novell's NetWare 4.0 offer increased functionality to their respective users and provide selected synchronization services to integrate external directories.

Both Banyan and Novell claim to have X.500-like capabilities — meaning they structure information in a fashion similar to X.500 but don't support DAP and DSP.

NetWare 4.0's NetWare Directory Services

directory services

(NDS) replaces the pre-NetWare 4.0 bindery and, according to Kevin Auger, Novell's NetWare product-line manager, supports the move "from a server-centric to a network-centric view by supporting a global naming service."

In the past, NetWare users trying to access services on multiple servers needed to register and log-on to each server. With NDS, a user needs to be defined only once to have access to all resources across an enterprise network of NetWare servers, limited only by the user's security clearance. This only applies to users of NetWare 4.0 because NDS is not yet supported on NetWare 2.X and 3.X servers.

Novell's Global Message Handling Service (MHS) messaging product and NetWare 4.0 will initially use different directories. Global MHS currently runs on NetWare 3.X and has a proprietary directory service. Novell plans to integrate future MHS versions to leverage the powerful NetWare 4.0 directory service and eliminate redundant directories.

A particularly appealing feature for the security-conscious user is NetWare 4.0's support of encryption and access control down to the attribute level.

Attribute-level access control would, for example, enable an authorized user in the human resources department to access information on an employee's salary level or home telephone number, while restricting access to these fields for other users. Strong authentication allows encrypted signatures to be used to validate the originator or recipient of information.

Banyan has extended its traditionally strong directory services offering with the announcement of StreetTalk III and ENS. StreetTalk III provides directory and naming services for the Banyan VINES environment, while ENS extends these and other traditional VINES services to the NetWare user base. Banyan plans to offer ENS on additional platforms in the future.

Barry Burke, Banyan's director of software, characterizes StreetTalk III as an enterprise-ready directory "offering instantaneous and flexible searchability, scalability and support for heterogeneous directory services."

That means users will be able to search with limited descriptive information and integrate StreetTalk III with other applications and network directories. This will be supported by adding directory integration tools, an updated object query model and advanced management tools to the existing suite of StreetTalk functions.

StreetTalk III's directory integration is achieved via a set of new application program interfaces

(API) that are being implemented by vendors such as Soft-Switch, Inc., Reach Software Corp., Beyond, Inc. and WordPerfect Corp. Applications supporting the APIs will be able to use StreetTalk as the primary directory service or synchronize other directories using StreetTalk.

The updated query model allows objects to be identified by a name with an unlimited number of attributes associated with it. This will let a user issue a query such as "Locate a color laser printer on the 11th floor." Banyan does not support access control down to the attribute level, however.

ENS offers StreetTalk directory services and administrative controls in NetWare 2.X and 3.X environments, enabling users to apply ENS in a mixed NetWare environment. Novell's own NDS doesn't run on NetWare 2.X and 3.X servers in the initial release. Burke said Banyan plans to support NetWare 4.0 in the near future.

View from E-mail

Directory synchronization is an absolute necessity for users with a portfolio of legacy E-mail services. These services have proprietary directories that need to be integrated to support an enterprise-wide E-mail network (see graphic, page S4).

X.500 will not, by itself, synchronize disparate directories — although it could act as a master directory — and there is no widely deployed standard for directory synchronization. But a new protocol, called Directory Exchange (DX), was announced in late 1991 and billed as a multivendor standard for directory synchronization. The announcement was spearheaded by Retix and supported by DEC, Novell, Sprint Corp. and Soft-Switch.

However, Retix appears to be the only vendor actively supporting DX-based directory synchronization. Soft-Switch and DEC contend that their customers have little interest in DX and say they'll only support it when the market is ready.

If X.500 isn't the immediate answer to integrating legacy directories and there's little support for DX, where should users turn to solve their directory synchronization problems?

There are three basic choices: a specialized synchronization tool set, such as those provided by Soft-Switch and DEC; synchronization tools from a primary mail provider; or a custom solution.

(continued on page S4)



While a variety of new wares offer improvements, directory services still have far to go before they really ease the task of distributed computing.

(continued from page S3)

DEC and Soft-Switch offer state-of-the-art products for multivendor directory synchronization. Their tools support a

DEC recently announced an upgraded synchronization offering that supports bi-directional directory synchronization between environments such as cc:Mail,

is recommended. The tremendous effort required to integrate legacy directories, even after the purchase of synchronization tools, has limited the use of such tools. Many users have opted to develop internal programs to synchronize directories.

According to Dan Blum, a principal at Rapport Communication, a Cincinnati-based consultancy, "There will be another three to four years of development before automated directory synchronization will really work. Directory synchronization is a poor substitute for the commonality in directories we must strive to achieve."

At best, directory synchronization is a partial solution to the problem of integrating legacy systems into an enterprise network. The emerging paradigm calls for interenterprise directories and hybrid public and private electronic messaging environments, and that can only be realized through X.500.

X.500 vendor status

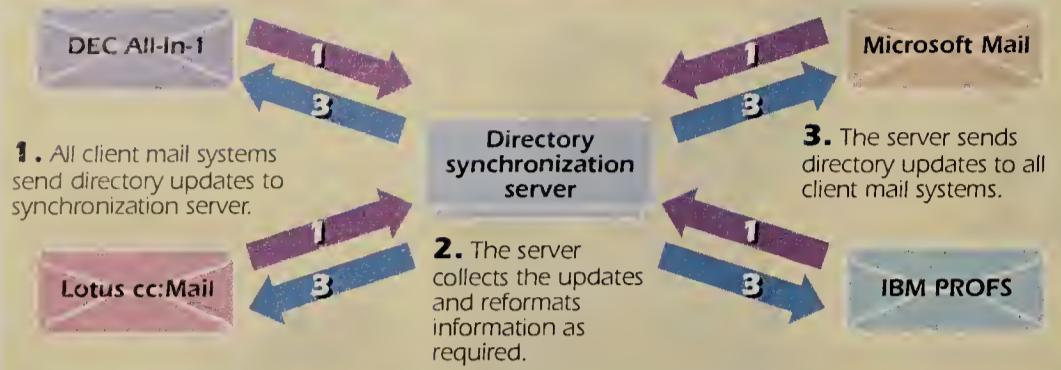
DEC, Hewlett-Packard Co. and the International Standards Organization Development Environment (ISODE) Consortium have emerged as leading providers in the embryonic X.500 market. Other X.500 vendors include Control Data Systems, Inc., ICL North America NCR/AT&T, OSIware, Inc., Retix and Unisys Corp.

DEC's X.500 offering is an implementation of the full 1988 standard with selected 1993 extensions. The firm markets DEC X.500 Directory Server software and DEC X.500 Administration Facility software.

DEC's X.500 runs on OpenVMS and Ultronix platforms and works over both Open Systems Interconnection and Transmission Control Protocol/Internet Protocol transports. It supports 1993 extensions, including enhanced access control, schema extensions, administrative controls and support for replication using the shadowing protocol defined in the 1993 standard.

"There will be another three to four years of development before automated directory synchronization will really work," says Dan Blum, a principal at Rapport Communication.

Synchronizing directories



GRAPHIC BY SUSAN SLATER

large number of diverse directory services, but even these tools can only make integration easier, not automatic. Both vendors offer comprehensive — and expensive — consulting services to help integrate diverse directories.

Soft-Switch's Directory Synchronization Protocol (DS/P) supports a client/server model, with servers running the Soft-Switch Central platform and supporting more than a dozen types of client E-mail systems. Soft-Switch is currently beta-testing its Enterprise Mail Exchange (EMX) synchronization facility, which supports DS/P. Banyan and Microsoft Corp. (for its Microsoft Mail) plan to support DS/P.

PROFS and DDS. DEC also supports the X/Open Company, Ltd.'s X/Open Directory Service interface to allow disparate directory information to be imported to and exported from an X.500 directory.

Steve Farrowich, director of service delivery at DEC, considers this offering a "great way to introduce X.500 technology into companies." He also views this as a means of integrating X.500 with legacy environments.

Synchronization may be achieved using basic import/export facilities from E-mail providers such as Lotus and Microsoft. If, however, an organization needs to synchronize a large number of diverse systems, a high-end synchronization tool set

Schema extensions allow administrators to more easily customize the directory. The 1993 additions provide enhanced control over directory access, improved administrative control and support for full distributed directory operations. DEC plans to support personal computer user agents and integrate X.500 with DEC's proprietary DDS directory in the future.

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HP was an early adopter of the X.500 standard and has a comprehensive, manageable offering. The HP X.500 product supports the 1988 X.500 specification and consists of Directory User Agent and Directory System Agent software.

Roy Vandoorn, HP's X.500 product manager, says, "Users are not yet demanding 1993 X.500 functionality." While HP doesn't support the 1993 standard, it has added proprietary management and administrative support, and offers a phonetic search facility.

Phonetic searching allows queries to be resolved without knowing the exact spelling of a name. For example, an object called Gary Rowe, and attributes associated with Gary Rowe, can be found by conducting a phonetic search.

The ISODE Consortium is a nonprofit organization based in London that is building upon mature public domain X.400 and X.500 technology to offer commercial-quality products. For example, the consortium is providing a commercial implementation of the Quipu public domain X.500 software. Quipu is a 1988 X.500 product with proprietary extensions supporting access control and replication.

The first commercial release of X.500 was delivered in March to members of the group. It includes support for the lightweight DAP, which is a streamlined version of the X.500 DAP facilitating user agent access to the directory.

Steve Kille, president and chief executive officer of the ISODE Consortium, de-

scribes the difference between his group's and the public domain offerings as substantial. "Implementing the protocol engine is only a small part of deployment," he says. "Offering a deployable, manageable X.500 product is the real challenge."

ISODE Consortium members include NCR/AT&T, Control Data and Mitre Corp. NCR currently uses the ISODE Consortium offering as the basis for its StarPRO Open-Directory500 product.

Soft-Switch announced X.500 in June 1992, along with the introduction of its EMX synchronization tools. X.500 availability was scheduled for the end of 1992, but the company pushed that back to late this year or early 1994, saying that users put higher priority on delivery of EMX.

"X.500 is on a vector all its own — it has nothing to do with E-mail," contends Greg Loux, Soft-Switch product marketing director. "The real issue for E-mail users is integrating the legacy directories found in many large organizations," says

Greg Loux of Soft-Switch.

What's next?

Rolf Krause, NCR/AT&T senior product manager, views X.500 as middleware. NCR plans to use the same X.500 software base to support E-mail, network management and NCR's implementation of the Open Software Foundation's (OSF)Distributed Computing Environment (DCE). The company recently worked with Enterprise Solutions, Ltd. to provide a comprehensive X.400 and X.500 offering for Wal-Mart Stores, Inc.

Microsoft sees X.500 as a critical technology in supporting messaging and plans to introduce an X.500-architected directory — not supporting DAP and DSP — in 1994. Microsoft is also continuing to invest in directory synchronization tools.

HP's Vandoorn believes X.500 will be the major directory technology in the

mapping from existing directories or databases to new directories without manually reentering the data.

The war between directory synchronization and X.500 will be deemed a draw as synchronization agents populate global X.500 directories. This will enable X.500 to be the master repository of directory information, which may be automatically synchronized with non-X.500 directories.

Standardized X.500 access control and privacy features will also convince security-conscious users to selectively open up portions of their private directories to support open directory access.

And last, highly functional directories will become increasingly integrated in operating systems, network servers and E-mail platforms, providing a basic utility to be used by all applications and users. Banyan, DEC, Microsoft and Novell have already set the stage for this evolution with recent product introductions and statements of directions.

Significant progress has been made during the past year, and while the directory services puzzle has not been solved, the pieces are at least out on the table. □▽○

Rowe is a principal of Rapport Communication, an education and consulting firm in Cincinnati. Rapport recently introduced an electronic messaging newsletter and an in-depth messaging vendor report series. Rowe can be reached via the Internet at gjrowe@attmail.com.

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Change is the only sure thing



CYNDY PATRICK

One thing in life is for sure: Things change. Sometimes faster than we can keep up. Such is the case in internetworking. Network operating systems (NOS) continue to advance in functionality. Transport protocols and new equipment that provide connectivity between a wider range of disparate devices, and network services that operate at ever-higher speeds are hitting the market.

These changes are in response to a shift in how computer networks are being used. Today's enterprises depend on heterogeneous computing devices — everything from personal computers on interconnected local-area networks to minicomputers and mainframes spread across town or across the world. These systems must exchange everything from simple data files to high-resolution graphics and multimedia presentations that include full-motion video.

With such diversity, users are struggling to find the magic pill that will cure all their networking ills. And the rapid introduction of new technologies makes the job more difficult. Indeed, the task is vastly tougher today than just a decade ago, when computing architectures were dominated by a single vendor and T-1 circuits were considered the cutting edge of connectivity.

"New applications, such as document imaging, multimedia and video, are placing demands for higher bandwidth on internetworks," says Gerald Ryan, president of Connections Telecommunications, Inc., a Brockton, Mass., developer of network

In networking — as in life.

design software. "A need for universal connectivity between enterprises, their customers and other organizations further fuels these demands."

Ryan says new technologies such as Asynchronous Transfer Mode (ATM), frame relay and Switched Multimegabit Data Service (SMDS) promise to deliver the bandwidth that those applications require. "The only questions that remain are to whom, when and how this bandwidth will be delivered," he says.

There is no textbook formula to guide network designers through the maze of options for building a network today. Instead, they must take an iterative approach whereby key factors are considered on a stand-alone basis and reconsidered on the basis of how one may affect another.

The resulting iterations seem endless. Designers

can base a plan on any one of a dizzying array of new or enhanced LAN and wide-area network infrastructures including ATM, 100M bit/sec Ethernet, 16M bit/sec token ring and Fiber Distributed Data Interface-over-copper cable (see "Slow progress on high-speed communications," page S34).

Then they need to see how a whole new genre of internetworking hardware such as intelligent hubs and routers fit into that infrastructure.

Last, but certainly not least, layering an internetwork management system on top of the infrastructure can result in still more iterations to review (see graphic, page 8).

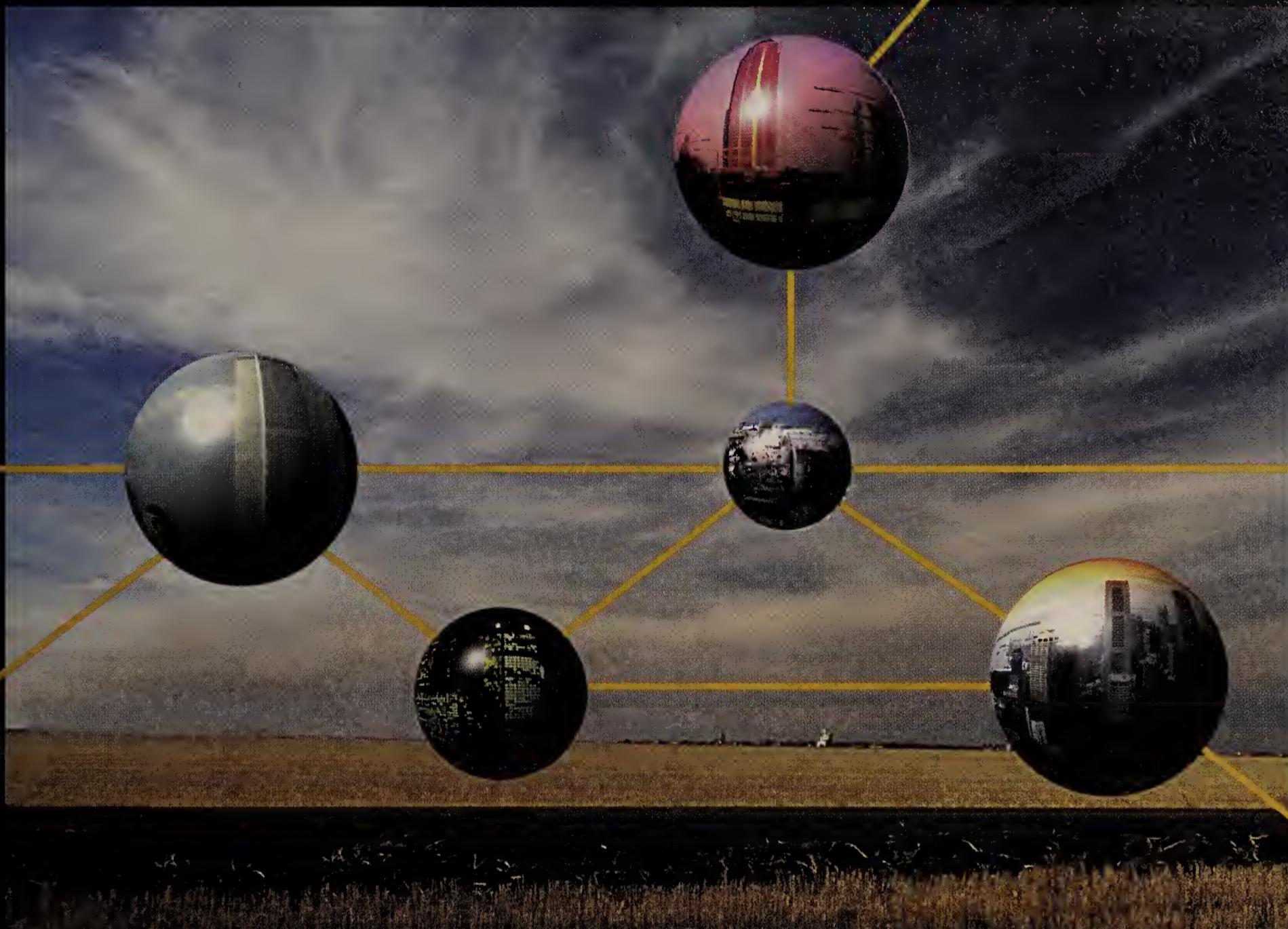
The drawing board

Balancing design issues with the need to meet end-user requirements proves to be a challenge. "Users dictate their requirements to our network group, which narrows our selection of design alternatives," says Carlos Ameri, senior communica-

(continued on page S8)

BY MARK A. MILLER

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(continued from page S6)

tions analyst at Cooper Industries, Inc.'s Cooper Hand Tools Division in Apex, N.C. "In addition, we are under pressure to reduce costs while increasing the reliability of the network. It takes a magician to balance all of these competing constraints."

Assuming that end-user applications are a nonnegotiable constraint, the design problem can be simplified to one of providing the optimum LAN and internetwork solutions.

Starting at the LAN level, NOSes have expanded beyond local communications to support enterprise-wide communications. When LANs were first developed in the mid-1980s, users just wanted NOSes to meet a single work group's need to share files and peripherals. Now they want NOSes to provide those features across the far-flung reaches of the enterprise.

But that isn't enough. Users are now demanding that the NOS provide interoperation among various vendors' computers on the internet.

Today, most NOS vendors have added for Transmission Control Protocol/Internet Protocol services to their products. Apple Computer, Inc. offers MacTCP, while Banyan Systems, Inc.'s VINES, Novell, Inc.'s NetWare and Microsoft Corp.'s LAN Manager support TCP/IP in their core operating systems.

Talking transport

An example of the iterating process required to design internetworks is searching for the trade-offs between the applications and communications protocols supported by the NOS and the transport protocol such as TCP/IP. One NOS vendor's support for TCP/IP may be much better than another's.

Compounding the problem is the need to link various legacy networks, such as IBM's Systems Network Architecture and Digital Equipment Corp.'s DECnet. These formerly proprietary architectures are yielding to customer pressures and providing more open solutions.

For most users, TCP/IP is now considered the preferred solution, although there are, again, varying degrees of support for it in different legacy network architectures. But emerging Open Systems Interconnection-based solutions such as the Connectionless Network Protocol (CLNP) and enhancements to more traditional solutions, such as IBM's Advanced Peer-to-Peer Networking (APPN), are coming of age. CLNP provides many more network addresses than TCP/IP currently does, and APPN provides a nice way to integrate SNA traffic onto the internet.

One of the ways to discover which solution is optimal is to set up a trial network and test various iterations and traffic mixes.

"While TCP/IP has become the backbone of choice, it is important to realize that SNA mainframe applications and its users are not going away," says Scott Palmquist, director of product marketing at McDATA Corp. in Broomfield, Colo.

very well challenge the traditional router's role as the key access platform for both LAN and WAN internetworks."

ATM backplanes will enable intelligent hubs to shuttle data among its many interface boards at vastly greater speeds, thus increasing the amount of data it can handle at any given time.

While the hub may be the challenger of tomorrow, router ven-

because today's WAN links, which make extensive use of fiber-optic transmission, have a much lower bit error rate than those of a few years ago. For all practical purposes, frame relay service access rates go up to T-1 speeds.

ATM and SMDS also make use of optimized protocol processing, utilizing a technology known as cell relay. A transmitted message is divided into cells comprised of 53 octets. ATM switches these cells on a connection-oriented basis, while SMDS provides a connectionless service. Connection-oriented links enable a device to transmit all packets over a predefined network path to the end point. With a connectionless service, a device sends packets to a network switch, which forwards them individually along any available path to the end device.

SMDS, based on the IEEE 802.6 standard, is intended for transmission rates of up to T-3. ATM, part of broadband Integrated Services Digital Network technology, is capable of transmission rates higher than T-3.

Again, putting these technologies through an iterative design process is the best way to determine the trade-offs. Designers also need to take the availability of high-speed access to these services into account.

"Although frame relay, SMDS and ATM were all designed with high speeds in mind, low-speed access to these services may still be necessary in the short term," says Gary Kessler, a senior mem-

The heterogeneous nature of internets makes a homogeneous system — the internetwork management system — an absolute requirement.

Invariably, the system used to manage internets will be based on SNMP. SNMP Version 2, finalized in April, is now being integrated into numerous products. SNMPv2 includes enhancements that enable management workstations to collect bulk management data from network devices. It also enables different SNMP managers to exchange data, includes a set of security features and supports multiprotocol transports using AppleTalk, Internetwork Packet Exchange (IPX) and OSI.

"Network management is a key element for any of our purchase decisions," says Bill Newman, a telecommunications engineer for Public Service Company of Colorado in Denver. "We have standardized on an SNMP-based network management platform and insist that any new components for our internetwork be SNMP-compatible."

Vendors are interested in these multivendor management solutions, as well.

"Mission-critical applications that are migrated to client/server networks require mainframe-like reliability," says Marc Schwager, product manager at Hewlett-Packard Co.'s Network Test Division in Palo Alto, Calif. "To achieve this, network management instrumentation, such as monitors and analyzers, must be integrated into those distributed environments. That instrumentation must adhere to industry standards, support multivendor configurations and have a modular, flexible architecture to facilitate growth."

This changing face of network management and other network elements illustrates that enterprise internetworks are designed as limited edition — not mass production — systems. The challenge becomes balancing the hardware and software, LAN, metropolitan-area network or WAN components, and network management systems that make enterprise internetworks operate successfully.

And rest assured, just as soon as the job is finished, things will have changed enough that it'll be time to start over. □▽○

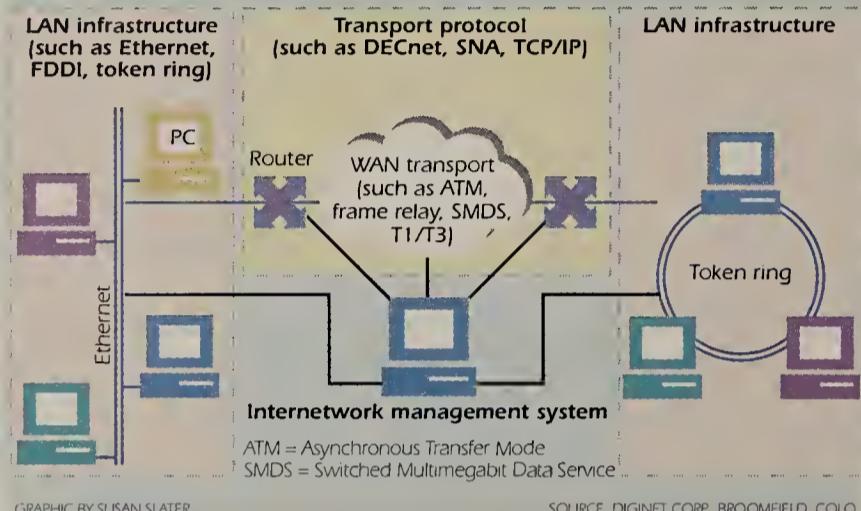
The installed base of LAN internetworks is growing at an annual rate of 29.2%, according to market research firm International Data Corp. of Framingham, Mass. As a result, the design of these internetworks becomes a critical function in today's business.

ber of the technical staff at Hill Associates, Inc. of Colchester, Vt., a data communications consulting firm.

End-to-end availability of these technologies is a critical issue, however. "Frame relay, SMDS and ATM all must be in the tool kits of network service providers, equipment vendors and network managers," Kessler says. "I believe that it is a mistake to position these as competing technologies, trying to sell one service over another. All fit into the wide spectrum of data and telecommunications service requirements; we don't have enough experience yet to declare winners and losers."

Miller is a contributing editor to Network World and president of DigiNet Corp., a Denver-based data communications engineering firm. His latest book, Managing Internetworks with SNMP, discusses implementation of SNMP and SNMP 2. Miller may be reached via the Internet at mark@diginet.com.

Elements of the enterprise internetwork



"Rather than approaching the transport issue from a more traditional proprietary solution, such as DECnet or SNA, our customers are asking for ways in which the proprietary solutions can be integrated into an open architecture," Palmquist says.

LAN infrastructure

While vendors have been busy building more advanced transport protocols that handle end-to-end connections, there have also been advances in how devices connect to the net. Earlier debates on the virtues of token ring over Ethernet are being replaced by concerns over how multiple LAN, metropolitan and WAN architectures can peacefully coexist. The capabilities of intelligent hubs have resolved, however, much of this debate.

"Third-generation hubs simplify the strategic planning, design, installation and management of enterprise networks," says Douglas Gold, director of communications research at International Data Corp. in Framingham, Mass. Emerging high-end hubs can integrate multiple media types, such as Ethernet, token ring and FDDI, into a single platform, he says. They also include WAN interfaces supporting 1.544M bit/sec T-1, 45M bit/sec T-3 and various Synchronous Optical Network rates. They can also be managed using the Simple Network Management Protocol.

"In the next few years, we expect ATM to be the preferred [intelligent hub] backplane technology," Gold says. "When this occurs, these high-end hubs could

dors are enhancing their products for greater capabilities today. Support for multiple topologies, transport protocols and WAN links is becoming the rule rather than the exception.

For example, Cisco Systems, Inc. of Menlo Park, Calif., offers support for multiple interfaces, WAN links and protocols on the high-end Cisco 7000 router. This approach gives network managers and designers greater flexibility than with other routers.

WAN infrastructure

Requirements for providing interactive links between applications that generate enormous files — such as computer-aided design and manufacturing — place corresponding demands on WAN links for greater throughput and reliability. While analog leased lines and T-1 circuits were adequate just a few years ago, those point-to-point, circuit-switched solutions lose cost-effectiveness as the number of distributed locations increases.

In these situations, fast packet solutions such as ATM, frame relay and SMDS provide greater flexibility than fully connected mesh networks.

Perhaps one of the most talked about emerging network technologies of late is frame relay. This packet-based technology uses a connection-oriented service that relies on transport protocols to provide end-to-end reliability. This replaces the need for every network device to check for errors as data passes through on the way to its destination.

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Serving up multimedia

BY JOANNE CUMMINGS

There's no easy recipe for adding multimedia to your current mix of network applications. Incompatible legacy systems, net bandwidth constraints, throughput bottlenecks, lack of adequate storage capabilities and other factors all conspire to make the problem seem insurmountable.

But supporting multimedia applications should get easier this fall with the expected introduction of multimedia servers from IBM and Apple Computer, Inc., as well as the finalization of Interactive Multimedia Association (IMA) standards for creating and sharing distributed multimedia applications.

"I think video and multimedia servers will become real within the next year," says Nick Arnett, president of Multimedia Computer Corp., a Campbell, Calif., consultancy specializing in multimedia technology. "But there will still be significant constraints. People's hunger for storage capacity will outpace even those servers' ability to deal with it; they want terabytes on line, and that's more than any server can cope with."

IBM is one vendor attempting to meet the problem head-on, having announced several new products that enable its various hardware platforms to act as multimedia servers.

Late last year, the firm addressed the multimedia storage issue with the announcement of a new version of Workstation LAN File Services/VM software for its ES/9000 mainframe (NW, Nov. 16, 1992, page 1). The VM-based software enables the mainframe to act as a file server for IBM OS/2 LAN Server nets and devices attached to Transmission Control Protocol/Internet Protocol local-area networks.

The new version includes modules that let users store large files, such as full-motion video, on direct-access storage devices linked to the mainframe and download them to the LAN server. From there, the server can distribute the files over a token-ring LAN. This method helps ease the problem of storing large multimegabyte files while preserving ready access for LAN users, IBM says.

Arnett agrees. "With multimedia on a network, the problems come in addressing the necessary storage and dealing with the contention problems," he says. "Once you cram that many controllers and disk drives into one machine, it starts looking a lot like a mainframe, so turning a mainframe into a multimedia server may make some sense."

There are some caveats, however. For example, mainframes are designed to handle several small data transactions, rather than serving the large continuous streams of data necessary for quality multimedia transmissions. "Just because it's larger doesn't necessarily mean it's better for multimedia," Arnett says.

"I think everyone in the mainframe business is trying to figure out ways to stay in business," he says. "But I'm suspicious of it because it's so self-serving for mainframe companies [to become multi-

media server companies]."

In March, IBM sought to address the throughput bottleneck with its announcement of the LAN Streamer MC 32 adapter (NW, March 8, page 2). The 32-bit token-ring adapter can process 1K-byte frames at 48K frame/sec and offers 14.3M bit/sec throughput over a 16M bit/sec Token-Ring, a 70% improvement over the firm's previous adapters.

The devices also offer a priority queuing feature that lets high-priority traffic circumvent other traffic on the server. This is important in multimedia applications because sound and video data need to be synchronized and cannot be disrupted, the company says.

Vendors and industry groups tackle the problem of adding video, audio and image to today's data-intensive network servers.



IBM also announced new LAN Server software that uses Token-Ring's priority mechanisms to enable users to run as many as 10 uninterrupted 150K bit/sec multimedia sessions over a single token-ring segment along with traditional data traffic.

The software, which runs on a Personal System/2 Model 95 server, works with DOS, Windows and OS/2 clients. It uses the standard OS/2 file system to store multimedia files and can store as many as 10G bytes of multimedia data at a time.

The LAN Server configuration also takes advantage of the multimedia capabilities LAN Streamer MC 32's to provide even better performance, the company says.

In May, IBM announced new software that enables its RISC System/6000 minicomputer to act as a multimedia server in an AIX environment. The Ultimeda Server/6000 is client/server software designed for the RS/6000 family of servers and OS/2 clients on a TCP/IP network, although IBM plans to extend the software to work with AIX, Macintosh and Windows clients.

The server portion tracks the number of active

multimedia sessions and ensures that enough network resources are available to guarantee on-time delivery of multimedia data.

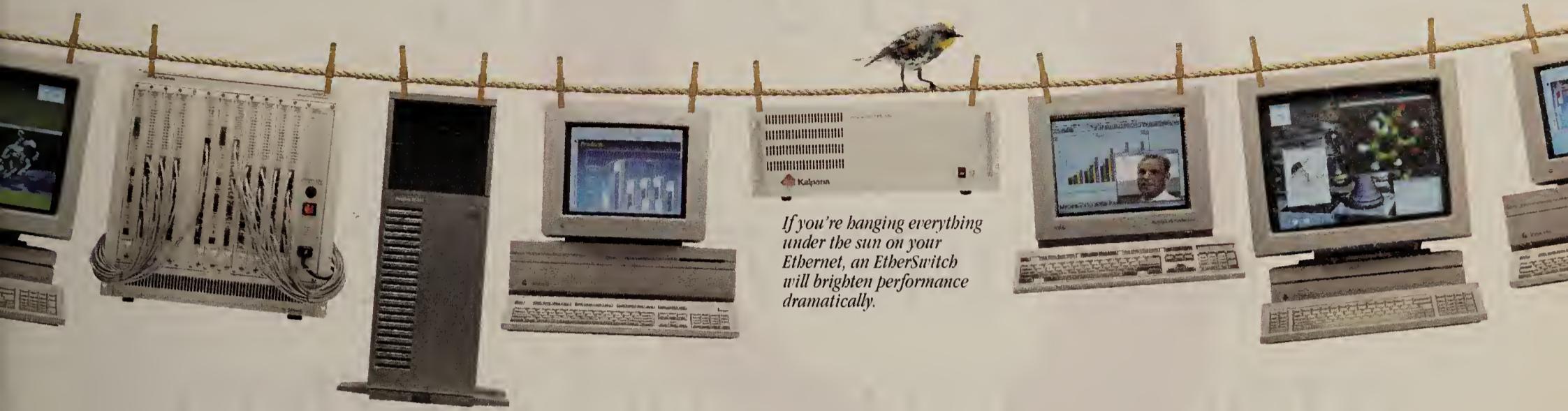
If a user requests a multimedia session after a predefined limit has been reached, the server denies the request and queues it to run when the required bandwidth is freed up. This guarantees that service levels remain adequate for all of the multimedia sessions on the LAN.

The software uses TCP/IP to handle the transfer of continuous data between the server and the clients. In addition, when used on a Token-Ring Network, the software utilizes token-ring's inherent priority mechanisms to guarantee video delivery. The software will support multimedia over Ethernet LANs on a "best effort" basis, according to the company.

In addition, Ultimeda Server/6000 uses a new file system optimized for storage and retrieval of video and audio data in real time, as well as AIX file system maintenance utilities to back up, restore and copy files. An RS/6000 server configured with the

(continued on page S14)

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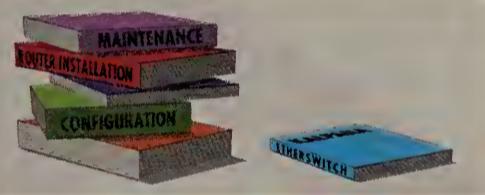
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(continued from page S10)

software can store as much as 100G bytes of multimedia data, the company says.

This fall, IBM is expected to round out its multimedia offerings with the announcement of new software for its Application System/400 minicomputer. Although IBM declined to provide specifics, sources say the software will enable the AS/400 to offer the same reservation protocols and guaranteed service levels as the RS/6000 product.

Until now, the AS/400's role as a multimedia server has been for analog video only, using a setup of server software and IBM F-Coupler technology. The F-Coupler is hardware that sits on both ends of a video receiver-to-personal computer link. It enables users to run as many as 70 analog video channels together with digital data traffic over a 16M bit/sec Token-Ring LAN.

The device enables the LAN to handle both types of traffic by distributing the analog data across excess bandwidth not used by the digital data. According to the company, it offers an alternative to pulling coaxial cabling throughout a site, enabling access to broadcast-quality video feeds, such as up-to-the-minute cable news programs, over shielded twisted-pair cabling.

"It's important in terms of multimedia networking that all of our platforms support digital information," says Herbert Cotter, director of multimedia technology for IBM in Somers, N.Y. "Right now, the AS/400 serves analog — but watch this space."

Cotter says IBM's strategy is to enable all of its hosts and servers to support multimedia information as if it were just another data type on the network.

"If we treat multimedia as special, we've got to put that information in a special server, which means we'll end up spending most of our time relating the information in the multimedia server with information contained within the traditional corporate database. That doesn't make sense," he says.

In addition, creating a special server for multimedia applications leads to other management problems.

"What if the network already has three servers on it?" Cotter asks. "You've really got to make sure the network protocols are consistent so that the video server doesn't run over the print server and so on."

To that end, IBM is developing a set of extensions to its current network management offerings, designed especially to manage multimedia-intensive networks.

"We'll be extending NetView and the protocols that exist within that to manage multimedia data," Cotter says. He declined to provide more specifics or availability dates.

Serving up Apple

While IBM may have the PC-based market covered, Apple is planning to roll out three parts of its own Macintosh-based multimedia product strategy this year.

Apple declined to comment on the upcoming announcements, but sources say the company plans to unveil this fall a dedicated multimedia authoring system, used for building multimedia presentations, a multimedia playback system and a multimedia server. All three products are expected to be based on Motorola, Inc.'s 68040 processor and should be upgrad-

able to the 68060 chip when it becomes available.

The three offerings are expected to include two sets of digital signal processors for off-loading the processing of sound and video from the main CPU. In addition, the machines will all come equipped with compact disc-quality sound.

The authoring system and server are also expected to enable users to input and output video from a television or video cassette recorder without the need for a special board.

In addition to the Motorola-based prod-

ucts, sources say they expect Apple to deliver a multimedia server based on the new PowerPC chip from Intel Corp. and IBM. "It's going to be such a fast processor that there's no doubt people including Apple will be applying it to servers," says one source who requested anonymity.

The standards process

Users looking to run multimedia applications in heterogeneous network environments should also get a boost when the IMA unveils three new specifications for distributed multimedia networking, sched-

uled for release by year end.

According to Philip Dodd, executive director of the IMA, the organization issued three requests for technology (RFT) in December 1992, all designed to ease multi-vendor multimedia integration.

The first RFT focuses on multimedia system services and states requirements for creating, transmitting and viewing synchronized multimedia information in a distributed computing environment.

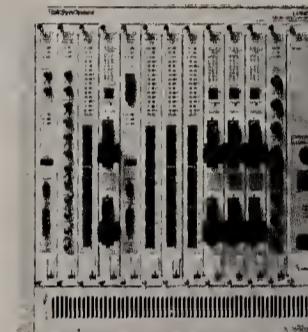
Hewlett-Packard Co., IBM and SunSoft, Inc. submitted a joint response to the services RFT as part of their recently an-

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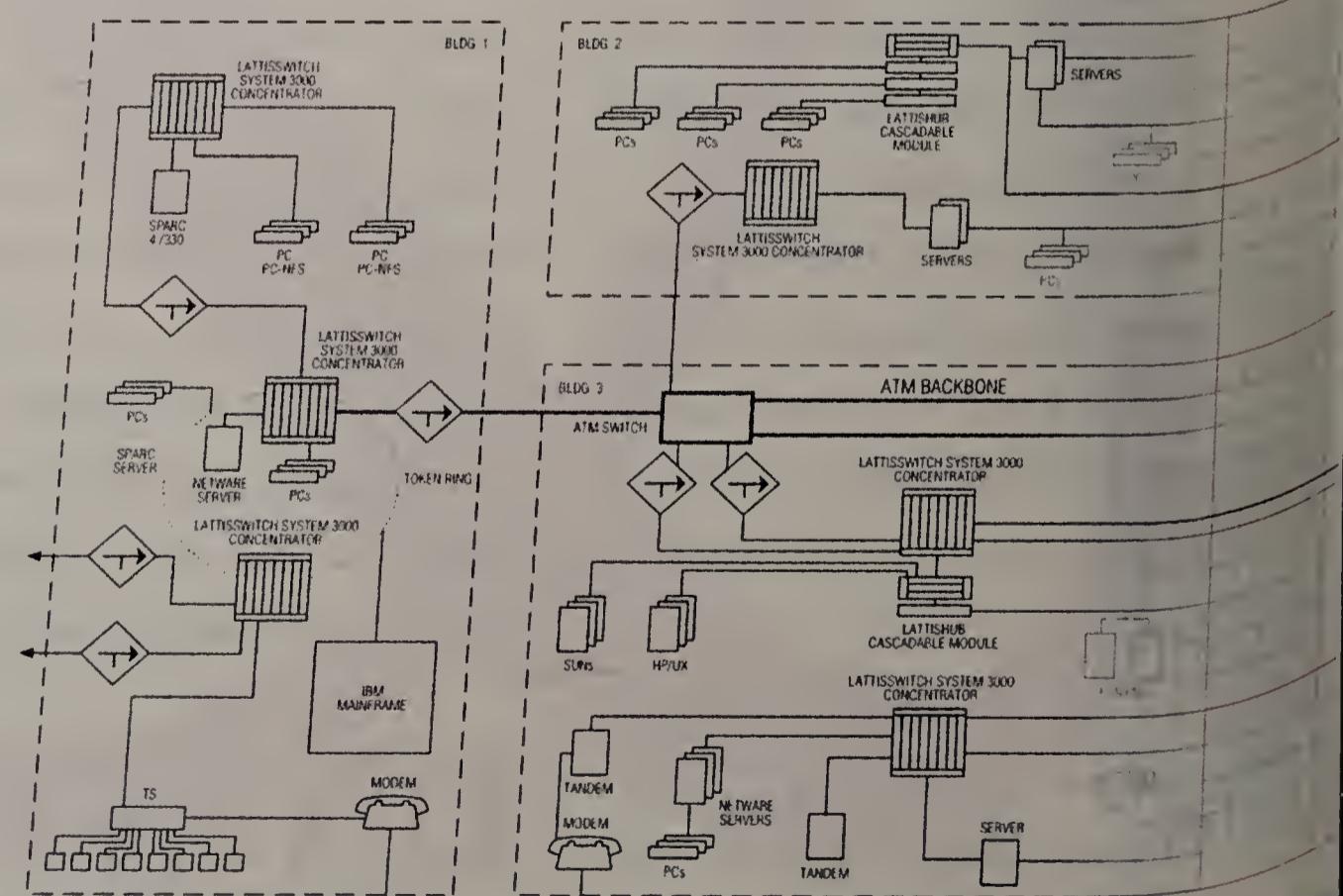
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nounced Common Open Software Environment (COSE) initiative, (NW, March 22, page 1).

"The RFT is designed to provide a common definition for multimedia services across a client/server environment within a heterogeneous network," Dodd says. "It's assuming that, across the network, you have varying bandwidth availabilities and platforms."

The COSE proposal's mandate is to guarantee the ability to transmit and synchronize multimedia content across networks.

According to COSE members, the proposal offers several pieces of technology that have been in the works some time. These include IBM's efforts to provide guaranteed service levels across the network, as well as portions of SunSoft's Solaris operating system, called Solaris Live, that enable users to incorporate sound, video and image into current applications in a standard way.

It will also incorporate HP's desktop environment, called Visual User Environment, which brings the various distributed pieces of information together at the client

workstation in a synchronized fashion.

The specifications will work on a model similar to today's X Window System, in that it will enable computers to serve various portions of the multimedia message, such as audio or image, to clients distributed across the net.

According to IBM's Cotter, the group is focusing on a standard set of application program interfaces (API) and streaming protocols, which are the protocols that ensure the synchronized arrival of multimedia information across the network.

These APIs and protocols will provide

quality-of-service specifications, enabling clients to request multimedia sessions of a certain quality, such as MPEG 1 data rates. The server software would then ensure that the session remains at that level and is uninterrupted across the network.

"It involves specifying the communications, the arm movement on the server, the buffers within the server, the buffers within the client and, in a multithreaded operating system, a thread through the operating system to get the information to the display and to the speakers in time," Cotter says.

According to Dodd, the specification is currently being evaluated by the IMA and is scheduled to be demonstrated in a working environment next month, along with a separate specification proposed by AT&T and NCR Corp.

Once the IMA is satisfied that the specifications work and meet all the requirements of the RFT, it will recommend that the technical working group and steering committee in charge of the specifications label them IMA Recommended Practices. If all goes according to schedule, that should occur some time this fall.

In addition to the distributed services RFT, the IMA has issued RFTs for a standard multimedia scripting language and multimedia data exchange specifications.

The scripting language calls for a platform-neutral language — much like BASIC in the traditional data world — that can define multimedia renderings and interactions. This would enable multimedia applications written just once in the scripting language to be run on a variety of platforms without modification, as long as those platforms run their own version of what Dodd calls a "scripting player," which is software designed for each platform that can read the common scripting language. The IMA is currently evaluating specifications from Kaleida Labs, Inc. and GAIN Technologies for this, he says.

The multimedia data exchange specification defines requirements for exchanging multimedia files among hardware and software platforms, as well as applications. The specification, which will probably be based on a combination of Apple's Bento file format and AVID Technology, Inc.'s Open Media Framework (OMF) multimedia file description environment, would provide a container and definition of data types for multimedia that is platform-independent.

"Right now, you have a file sitting on a platform, and you aren't sure what's in it unless you know how it was constructed," Dodd says. "Bento deals with the file wrapper and stores information about what's in multimedia files in a consistent fashion, while the OMF deals with the real definition of the data types inside very nicely. So they're very complementary."

Dodd says he expects both the scripting language and the data exchange specification to be completed by year end, as well.

Thus, by 1994, the industry will have served up a few more ingredients for souping up the network to serve multimedia. And with these new products and specifications, the task of networking audio, video and image should be a little less daunting. □▽○

Cummings is a free-lance writer based in Marlborough, Mass.

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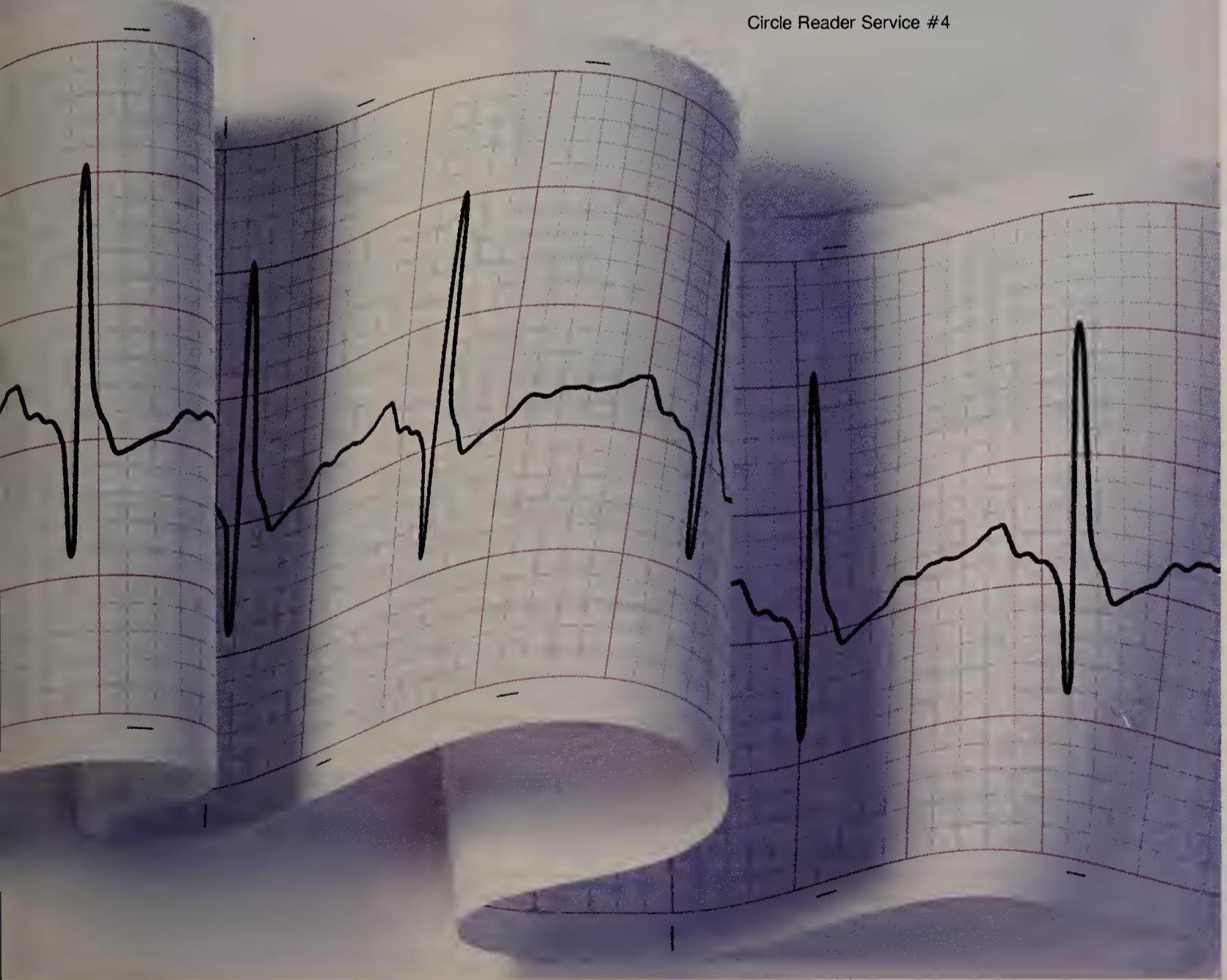
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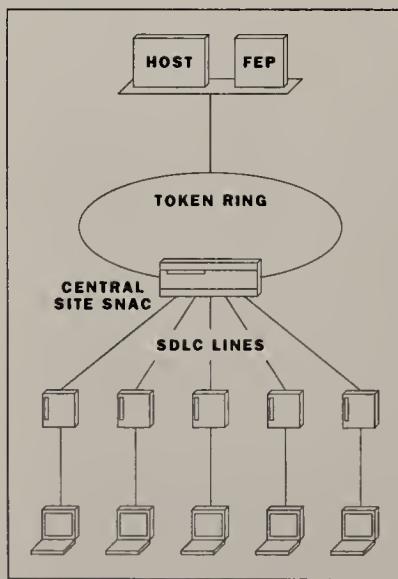


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Putting the ether back in Ethernet

WILL TERRY



As fast as networks expand, their reach is still ultimately dictated by the length of the wire, a leash that is leaving more and more network users straining at the end. Users want network support in the voids of the warehouse, the hospital corridor and the lunchroom.

Wireless technology is making it possible.

Wireless is already letting doctors access laboratory test results from the bedside of patients, helping retailers easily relocate point-of-sale terminals and letting users track the flow of goods into and out of warehouses.

But wireless has only recently begun to penetrate the office and is doing so at a snail's pace. Nevertheless, the opportunities for wireless connectivity in buildings and on campuses are many.

Applications

The wireless technology best suited for a given application depends on many factors. Range, throughput, interference immunity, power consumption, size or weight, cost and security are key considerations that influence technology choices. As with most things in life, there are trade-offs — no single technology offers the optimal solution for every category.

The graphic on page S19 shows how applications for wireless are split between voice and data on one dimension and between fixed and mobile on the other. No vendor has yet been brave enough to offer an integrated voice/data solution, although there has been some discussion about this in the IEEE 802.11 committee.

Wireless technologies for voice and data come to the fore.

Most of the action to date has involved wireless data nets in specific vertical markets such as retail. Giant chains such as Kmart Corp. and Wal-Mart Stores, Inc. are implementing wireless data nets in their stores to track and analyze the flow of goods.

In fact, Wal-Mart has used the technology to virtually eliminate warehouses and their associated costs and is now better able to ensure that popular items are always in stock.

But acceptance of wireless voice systems has lagged behind. To a great extent, this is due to the fact that the Federal Communications Commission has not allocated spectrum exclusively for indoor wireless telephone systems.

In the past few years, however, vendors have plunged ahead and adapted wireless telephone systems to use radio frequencies (RF) in what are known as the "consumer bands." These

BY IRA BRODSKY

frequencies were set aside for radiowave-generating gadgets that could be used without an operator's license. Such gadgets would include everything from microwave ovens to garage-door openers.

Technology

Wireless technologies for indoor use fall into two main categories: infrared lightwave and low-power radio. There are distinct strengths and weaknesses in both.

Among infrared's primary advantages:

- It is not subject to spectrum allocation or licensing in any country.
- It can run at high speeds for a relatively low cost.
- It is immune to many forms of electromagnetic interference that are endemic to indoors.
- It cannot penetrate walls, floors or ceilings (unless they are made of glass), making it highly secure.

But the quality that makes infrared inherently secure is, perhaps, its biggest drawback. The inability to penetrate solid objects severely restricts the coverage infrared can offer.

One firm, Spectrix Corp. of Evanston, Ill., has developed a microcellular network solution that uses a combination of wire and infrared links to cover an entire building or selected rooms and locations.

The system, called SpectrixLite, consists of concentrators on wire-based local-area networks, which are, in turn, tied via twisted-pair wire to access points in individual rooms. A single concentrator can support as many as eight infrared access points. Each access point can serve terminals as far as 50 feet away. Unlike infrared television remote controls, (continued on page S19)

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(continued from page S17) there is no need to aim the portable unit at the access point.

The infrared links run at speeds up to 1M bit/sec and use a deterministic protocol, ensuring support for as many as 1,000 users. In essence, Spectrix is offering the best of both worlds — the security and interference immunity of infrared and the coverage of RF.

The drawback is that this system sale can't be driven by individual portable computer users. Someone has to decide that users need this type of access on an enterprise-wide, or at least departmentwide, basis.

Unfortunately, omnidirectional infrared takes considerably more power than "point and shoot" communications, and infrared power consumption can be a problem for portable computers that are already squeezed for battery operating time.

Radio option

Radio-based wireless LANs overcome most of infrared's limitations but introduce other disadvantages.

Radio waves penetrate most indoor walls, meaning it is possible to cover a large number of rooms or even an entire building from a single radio base station. But the signal may suffer considerable attenuation when passing between floors or through exterior walls, depending on the thickness of walls and floors and the construction materials used in the building.

Portable radios are generally omnidirectional and may consume significantly less power than infrared, though as power is reduced, so is range.

In the U.S., licensed narrowband FM is largely being replaced by unlicensed TDMA and SST in terms of popularity.

But unlike infrared, there are a number of regulatory issues that affect radio technology. Radio transmitters can only be used on frequencies allocated for their specific use. Different countries may allocate various frequencies for the same use, making life difficult for manufacturers. Vendors must produce separate models for different countries, reducing manufacturing economies, which also results in higher prices for customers.

There are several licensed and unlicensed radio technologies

that can be applied to indoor networks.

The four most common are narrowband FM, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA) and Spread Spectrum Transmission (SST). There are also products that modify or combine these various technologies.

In the U.S., licensed narrowband FM is largely being replaced by unlicensed TDMA and SST in terms of popularity. FDMA, TDMA and SST are different forms of digital radio. This means that regardless of whether they are used to transmit voice, data or video information, data is sent as a bit stream.

To serve different users, FDMA simply divides the radio band, or range of frequencies, into discrete frequency channels. Most, but not all, digital radio technologies incorporate FDMA.

TDMA can be used for greater capacity by subdividing each radio channel into time slots. Individual users are assigned different time slots for transmitting and receiving.

For example, a TDMA system might use six slots per frame to support three user sessions. Each user is assigned a transmit and receive time slot.

Ericsson Radio Systems' Free-set wireless private branch exchange uses TDMA. Not surprisingly, this technology is favored in Europe and is the basis of the Digital European Cordless Telecommunications standard. However, there's no frequency allocation, per se, for TDMA in the U.S.

Tired of waiting for an allocation, Ericsson Radio adapted its technology to operate under FCC Rules Part 15 in the unlicensed consumer bands. Technically, all this means is that the product runs at somewhat lower power in the U.S. and indoor picocells might have to be spaced slightly closer together.

But there is another more serious implication to Part 15: Products operating under these rules have no protection from received interference and, worse, the customer can be required to shut down his system if it causes interference to a licensed user of the radio spectrum.

SST allure

Spread spectrum-based systems also run under Part 15, but they have a unique advantage. While TDMA transmitters must operate at about 1 mwatt to qualify for Part 15, spread-spectrum devices are given special rights. They can generate up to 1 watt of output as long as they meet other technical requirements.

Why the special treatment? Spread spectrum is inherently less prone to causing interference. In fact, SST is an amazing

technology with a colorful history.

During World War II, Hedy Lamarr and her friend, composer George Antheil, thought up an idea for a jam-proof radio system that would guide torpedoes to their targets.

Their idea was fairly simple: Design the transmitter and receiver to hop from frequency to frequency in synchronization. An enemy would have a difficult time jamming a signal that is a moving target. This type of spread spectrum is called Frequency Hopping Spread Spectrum (FH/SS).

only in specific frequencies at a given location. Because spread-spectrum signals are spread out over a range of frequencies, they can overcome multipath fading.

Most wireless LAN products use one or both of these flavors of SST. For example, NCR Corp.'s WaveLAN runs at up to 2M bit/sec using DS/SS in the 902- to 928-MHz band. Ericsson's Freeset uses TDMA only, while Spectralink Corp.'s Pocket Communications System uses a combination of TDMA and CDMA and operates in the 902- to 928-MHz band.

Rose Communications of San-

Francisco, Calif., offers a wireless key system that uses FDMA along with dynamic channel allocation. This means the link is constantly evaluated and the system automatically changes channels to get the best transmission quality as the mobile user moves about.

According to Clinicom, this system helps avoid malpractice suits and provides a complete record when a question does arise.

Many of these innovative hospitals are now bar coding patients, doctors, medications and supplies. Every drug administration, for example, is input in real time and generates an audit trail. The system can alert a nurse if medication is overdue or if the wrong medication or wrong dosage is about to be administered.

According to Clinicom, this system helps avoid malpractice suits and provides a complete record when a question does arise.

Business less receptive

Acceptance in the general business arena is slower. The office market is not going to replace cable with wireless anytime soon. But there may be applications for portable access to LANs and file servers, particularly among traveling professionals.

In fact, in these economically tough times, many organizations are getting tough: Sales representatives, consultants and auditors are expected to spend most of their time at customer and client sites, so their own firms are only giving them shared access to office resources. They must reserve a shared desk when they intend to be in the office.

These mobile users may end

Wireless enterprise applications

	Voice	Data
Fixed	• Cable replacement • Remote locations • Disaster recovery	• Cable replacement • Remote locations • POS terminals • LAN bridges • Trade shows • Disaster recovery • Alarm systems
Mobile	• Executive assistants • Doctors • Smokers • Visitor courtesy phones • Janitors • Security personnel	• Consultants • Auditors • Field sales reps • Enhanced meetings • Conferences • Wireless E-mail • Two-way paging

GRAPHIC BY SUSAN SLATER

SOURCE: DATACOMM RESEARCH CO., WILMETTE, ILL.

A more technical definition for spread spectrum is that it combines user information with a pseudorandom code to create a signal that uses considerably more bandwidth than the user information would require by itself. Spread spectrum "spreads" the signal out over a wide frequency range.

In the case of frequency hopping, the spreading is accomplished by serial hopping.

The other popular type of spread spectrum is called direct sequence. In Direct Sequence Spread Spectrum (DS/SS), the signal is spread out continuously. In other words, rather than hopping from channel to channel within a band of frequencies, it uses the entire band all the time.

Because they are so spread out, SST signals look like background, or white, noise to conventional radio signals. Likewise, conventional signals look like white noise to SST receivers. Using a technique called Code Division Multiple Access, it is possible to carry on many simultaneous voice or data sessions over the same wideband radio channel.

There are other advantages to SST. One that stands out is its ability to overcome perhaps the most pernicious radio impairment — multipath fading. This occurs when a signal takes more than one path to the receiver and arrives out of phase with itself. When the out-of-phase components combine at the receiver, they may cancel each other out.

Fading is a frequency-specific effect; at any given time, it occurs

ta Clara, Calif., offers a wireless key system that uses FDMA along with dynamic channel allocation. This means the link is constantly evaluated and the system automatically changes channels to get the best transmission quality as the mobile user moves about.

Early adopters

Besides its use in warehouses and on retail floors, the next big wave for wireless looks like it will be in the health care industry. More and more hospitals are recognizing the value of extending hospital information systems right to the bedside.

These so-called point-of-care systems enable the creation of complete electronic medical records for each patient. They can also be used to create a variety of reports and provide on-the-spot data access.

There are several advantages to using portable terminals with point-of-care systems. For example, they can be installed one per health care provider, rather than one per bed, reducing the number of terminals and wired locations required.

Alternatively, a portable terminal can be assigned to a patient and travel with that patient as they move, for example, from surgery to intensive care.

According to Dr. Michael Stefanchik, a market analyst at Clinicom, Inc., a vendor of point-of-care systems in Boulder, Colo., "The portable terminal allows the power of the system software to flow all the way to the point of care." Clinicom says all of its in-

up carrying notebook or laptop computers with built-in wireless communications. When in the office, they have access to the office LAN via wireless. Of course, similar temporary access can be achieved by using docking stations, but that usually assumes that mobile workers are using one or more standard platforms.

Proxim, Inc. of Mountain View, Calif., has introduced a spread-spectrum network interface card that fits into a Personal Computer Memory Card International Association (PCMCIA) slot in portable computers — a Type 2.0 card that supports hot insertion.

David King, vice president of

(continued on page S20)

(continued from page S19)

marketing at Proxim, says most of the wireless LAN activity is still in vertical markets, but Proxim has seen a pickup in the office market since the introduction of its PCMCIA PC Card.

The interface is targeted not only at mobile workers returning to the office, but at members of small work groups and project teams, as well as consultants and users at trade shows.

Proxim now supports in-building roaming by creating microcells that are interconnected by a standard cabled LAN backbone. Each cell covers a radius of 300 to 500 feet. As a user moves out of range from the original serving microcell, it is detected from the increased error rate.

Once the error rate exceeds a specific threshold, the serving microcell searches for other microcells that may be receiving a better signal. If one is found, the session is handed off to the new microcell.

King believes that, ultimately, there will be a need for portable computers with built-in wireless LAN capability. Users will want to use their PCMCIA slots for other purposes such as plug-in memory and wide-area network interfaces. They will use wireless short-haul data if it comes with the platform, but they may not be as anxious to purchase it as an

add-on.

The product Proxim is now shipping is 900-MHz DS/SS, but the company has announced a 2,400-MHz FH/SS PCMCIA card called RangeLAN2/PCMCIA, which it plans to deliver in the



fourth quarter. Motorola, Inc. has also announced it will develop a 2,400-MHz FH/SS PCMCIA wireless LAN card, which will have its own battery.

Although it is tempting to say that the lack of standards has hampered office acceptance of wireless technology, observers aren't sure this is so.

Although it is tempting to say that the lack of standards has hampered office acceptance of wireless technology, observers aren't sure this is so.

The IEEE 802.11 committee has been working on wireless LAN standards since late 1990. So far, the committee is composed of rather disparate interest groups, and there has been little progress. In fact, the effort has been divided into three separate projects, focusing on infrared, DS/SS and FH/SS technologies.

The radio technology effort is focused on the 2,400-MHz band, the same used by microwave ovens. This band, which is less crowded than the 900-MHz band, is near the 1,800- to 2,200-MHz band earmarked for emerging

personal communications services (PCS).

It is hoped that PCSs will provide a more suitable home for all sorts of wireless information network products — exclusive spectrum allocated for unlicensed use.

Proxim's King says the lack of standards isn't the reason for the wireless LAN's lack of success in the office. He agrees that a standard would help but says office users are just beginning to discover what they can do with wireless technology. He also points out that vendors can still implement standards differently so their arrival won't necessarily guarantee interoperability.

But others see it differently. Chip manufacturer National Semiconductor Corp. contends that the wireless LAN market is at a critical juncture. Gary Johnson, director of National's wireless networking business group, says standards are needed not only to ensure interoperability, but also to help minimize interference between products from different vendors.

National has proposed a "Unified Media Access Control" solution that borrows major elements from two competing 802.11 proposals. It is a hybrid approach that includes both carrier-sense multiple access with collision detection random access champi-

on by companies such as Xircom, Inc. and a reservation-based protocol pushed by IBM.

National's solution, however, only addresses the FH/SS radio camp.

It appears that National is trying to build a bridge between the divergent factions and is hoping to raise the prospects of its own technology in the process.

But there's little evidence that office users are poised to buy wireless LANs as soon as a standard emerges. Of course, if the

It is hoped PCSs will provide a more suitable home for all sorts of wireless information network products — exclusive spectrum allocated for unlicensed use.

802.11 committee thinks up a high-performance scheme that many vendors promise to support, users would benefit.

National's Johnson believes we are headed toward the development of a "radio on a chip"



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that will lead to the explosive growth of wireless. He points out that the biggest challenge for developers may be making the software that manages use of radio channel resources. But once we have an inexpensive, low-power radio on a chip, there's no doubt an army of software developers will be ready to join the party.

And here lies the wireless industry's chicken-and-egg dilemma: Vendors will invest the money needed to achieve the chip radio once they see more customers, but the customers won't come until they see the inexpensive, low-power devices made possible by silicon integration. New segments of the industry must always face this dilemma.

Indoor wireless technology will succeed because users prefer untethered over tethered connectivity. □△○

Brodsky is president of Wilmette, Ill.-based Datacomm Research Co. and chairman of the Wireless Data Conference & Exposition, which will be held Oct. 27-29 in Santa Clara, Calif. Datacomm Research publishes reports, provides consulting services and produces seminars on wireless technologies. Readers can reach Brodsky via radio at his Internet address: brodsky@radiomail.net.

Extending the enterprise to the field

Most of the action in enterprise wireless networking is focused on managing personnel and resources in the field. And one of the more interesting developments in this arena is technology that lets mobile nodes access local-area networks as if they were locally attached.

Isaac Schpancer, vice president of engineering at Racotek, Inc. in Minneapolis, calls this "Novell over the airwaves."

Racotek President Richard Cortese says he feels that too much emphasis in mobile metropolitan- and wide-area networking has been placed on radio technology. "Users don't care about technology; they care about applications," he says.

Cortese's firm is working with value-added resellers, systems integrators and independent software vendors to create or modify applications to work under Racotek's Mobile Network Operating System (R/MNOS).

Racotek has also developed powerful simulation tools that enable customers to select the best radio infrastructure for the required geographical coverage and traffic characteristics.

Clearly, Racotek wants software developers to produce applications that conform to its application program interfaces and work with R/MNOS.

In fact, the firm has shifted its strategy from selling equipment to the service end of the business. Racotek overlays its system on third party-operated two-way radio networks and resells voice and data airtime.

This approach differs from that of packet radio network operators such as ARDIS Co., RAM Mobile Data, Inc. and the Cellular Digital Packet Data (CDPD) Group, each of which wants customers to standardize on its particular radio infrastructure.

While these firms tout their systems as open, they are open only in the sense that they foster competition among mobile terminal manufacturers, software developers and — particularly in the case of CDPD — radio infrastructure equipment. They still force users to make radio infrastructure decisions they will have to live with for a long time.

Extending LAN-based applications into the field isn't as easy as falling off a log. There are

three major challenges:

- Mobile users on the network may periodically "appear" or "disappear" as they move into and out of radio coverage.
- Radio communications links are subject to a range of impairments such as noise and interference that may require use of for-

Racotek wants software developers to produce applications that conform to its application program interfaces and work with R/MNOS.

—∞—

ward error control, retransmissions and other techniques that may adversely affect latency and throughput.

- Most of today's radio infrastructures possess limited bandwidth, and it is difficult or impossible to extend data-intensive

applications out into the field.

Today, wireless links to the field are typically used in industries such as trucking, courier delivery and field service.

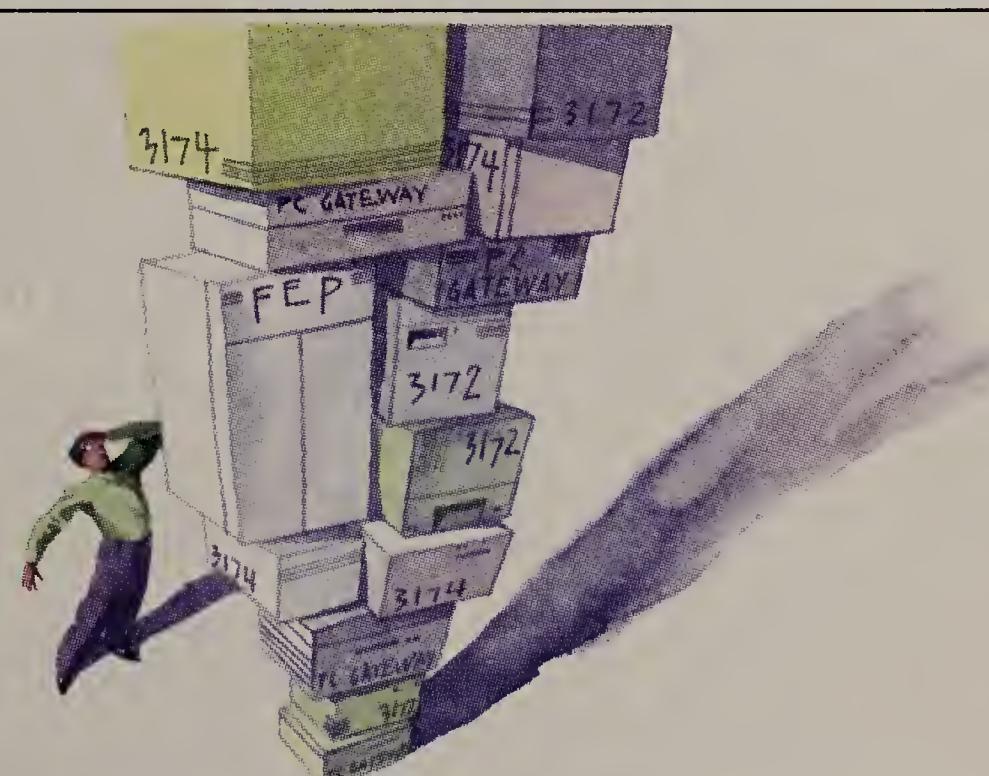
Transmissions over the radio infrastructure tend to be limited to a few routine text messages, parts of which can even be reduced to 2-byte macros.

But as white-collar professionals demand mobile access to the enterprise-wide network, the task will become much tougher and the bandwidth requirements much greater.

Client/server architectures will help overcome the bandwidth limitations of wireless infrastructures. But in the long run, there will be a need for wireless networks that support higher throughput than existing packet radio networks and even the new wireless networks using CDPD and other technologies.

Today's wireless networks support speeds from 4.8K to 19.2K bit/sec. But don't be fooled: These are raw radio bit rates and don't take into account protocol overhead — typically 40% to 60% — and channel contention by multiple users. The real throughput probably averages 240 bit/sec.

— Ira Brodsky



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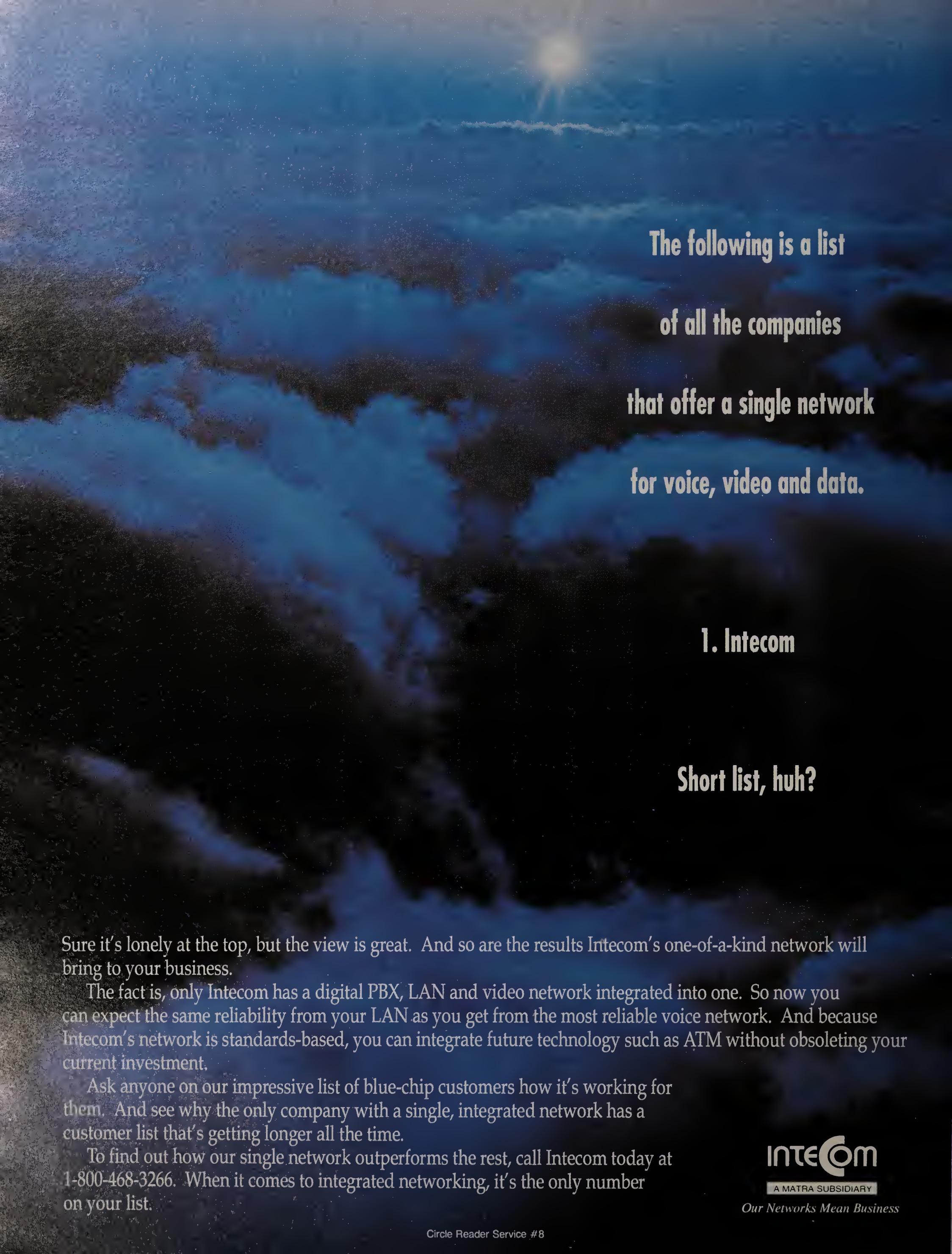
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Playing the right cards

The latest vendor software distribution and licensing strategies deal users a whole new hand.

BY MIKE HURWICZ

Victor Mutnick loathes software updates.

As corporate vice president of information systems (IS) at New York Life Insurance Co., Mutnick oversees the manual distribution of application upgrades and software patches to thousands of field agents.

"With 7,000 agents, it's a monstrous chore to send diskettes to everyone," Mutnick recently told attendees of the Mobile Computing Forum 1993 in Dallas. "The issue of software distribution is one of the biggest nuts we have to crack."

IS executives like Mutnick, who administer expansive local-area networks, are desperate for an alternative to the avalanche of floppy disks and tedium of visiting every workstation on the net to conduct a software installation or upgrade. It shouldn't be long, however, before New York Life and other companies open up the software distribution process.

Vendors are heeding the cry from users to provide electronic software distribution (ESD) tools that simplify the process of procuring and installing programs. Likewise, vendors are scurrying to offer electronic software licensing (ESL) products that automatically manage software usage across LANs and even across entire companies.

Unlike electronic mail and database vendors that must support a long list of application program interfaces (API), ESD and ESL vendors may not have to support multiple technology approaches since there are several initiatives under way to create uniform standards.

The Open Software Foundation, Inc. (OSF), for instance, selected Gradient Technologies, Inc.'s Network License Server (NetLS) as the basis for the licensing management portion of the Distributed Management Environment (DME), a component of OSF's Distributed Computing Environment. In addition to having the OSF's blessing, NetLS appears to be emerging as a de facto standard for software licensing.

NetLS consists of license server software, which issues "permissions to run" to applications over the network. But NetLS isn't just a technology for issuing licenses on the fly. Users may also employ it to inventory software and track program versions, user identifications and usage. This could allow

companies, for instance, to eliminate applications that are not being used or to buy additional licenses for high-demand applications.

from the availability of such an infrastructure.

But, he added, "It's hard to see how there will be much penetration of distributed licensing into the customer base before 1995 — and that's being optimistic."

In early 1992, 20 vendors, including Brightwork Development Corp., DEC, IBM, Lotus Development Corp., Microsoft and Novell, proposed a standard API called the Licensing Service API (LS API). LS API defines how applications talk to a licensing server. Any application supporting LS API can talk to any licensing server that backs the technology.

"It doesn't matter which licensing server the customer uses," says Dave Berry, product manager for Microsoft's unannounced desktop management product code-named Hermes. "The application sees a token coming back from the server, and then it will run."

There is no conflict between NetLS and LS API; NetLS is a license server technology and LS API is the interface that provides the link to a NetLS serv-



Digital Equipment Corp., Hewlett-Packard Co. and Gradient submitted the NetLS proposal to OSF. IBM, Microsoft Corp., Novell, Inc. and others say they will support it. OSF has yet to produce a reference version of the software, which programmers need to actually start implementing the specification. However, Gradient is already licensing the software to vendors like Novell, and other vendors are lining up for the OSF software.

"We are very supportive of adopting NetLS as an industry standard for licensing," says Peter Meekin, director of research for Dun & Bradstreet Software. "The industry hasn't yet provided very robust support for license management of distributed client/server applications."

Meekin says vendors of enterprise-wide client/server applications and their customers will benefit

er. Novell, for instance, is using NetLS and LS API together in its upcoming Electronic SoftWare Licensing for NetWare.

Miffed over distribution

On a separate front, the Desktop Management Task Force (DMTF), a group of vendors led by HP, IBM, Intel Corp., Microsoft, Novell, SunConnect and SynOptics Communications, Inc., is also working to define standards to support management of desktop machines — including software licensing and distribution — over a net.

The DMTF argues that before users can conduct ESD, they need to first consider the configuration of a given desktop computer and what applications are already running on the device.

(continued on page S24)

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The DMTF has defined a Management Information Format File (MIFF), which is an ASCII file that contains a wide range of useful management information about workstation resources. Vendors will ship and install MIFFs for system components, operating systems, expansion cards, application software — any hardware or software component on the desktop. Network management programs will look for MIFFs when they're prowling around desktop machines.

For instance, Microsoft's Hermes,

which includes software distribution capabilities, uses MIFFs to configure software for the individual desktop, Berry says. Hermes and MIFFs work in tandem to determine how much available memory the client has and what other applications are running.

The first version of the MIFF is due this summer, Berry says.

Eventually, the DMTF's Desktop Management Interface (DMI) will permit the registration of managed objects and provide a standard interface to MIFFs. Intel has already implemented an early version

of DMI. And although the official reference version of DMI is not as far along as the MIFF definition, it should, nevertheless, ship this summer, Berry says.

Once DMI is implemented in operating systems and vendors have shipped MIFFs, it will be possible to start creating management consoles that come in and inquire through DMI about which MIFFs populate each desktop workstation.

Observers caution that there is still a potential for standards fragmentation, however.

"You've got the traditional enterprise-

wide systems vendors extending systems management to encompass distributed systems, attempting to push it down to the desktop," D&B Software's Meekin says. In addition, companies like Microsoft and Novell are attempting to grow from LAN and client desktop vendors to enterprise-wide players. "A question to customers, and to us, is whether these two major approaches will converge or compete," he says.

Andrew Dailey, an analyst at Gartner Group, Inc., a Stamford, Conn.-based consulting firm, cautions, "The LS API, which is becoming a de facto industry standard, is not absolutely robust; it's relatively weak." Because it has been used little, Dailey expects the API will undergo evolutionary changes, as is customary with any technology.

Furthermore, even though NetLS has an early lead and the blessing of standards bodies and an increasing number of systems vendors, "NetLS has won the standards battles, but not the industry war," Dailey says.

Less than 300 independent software vendors and systems vendors have started implementing NetLS. "There are thousands of [independent software vendors], not to mention internal IS groups, that will have to adopt standards," he says.

Vendors, by and large, are not sitting by passively as the standards skirmishes unfold. Many have already developed a strategic direction to pursue software distribution and licensing issues, and some have already made changes as an interim step to more refined software license management practices.

Software vending machine

In late 1992, Computer Associates International, Inc. (CA) modified long-standing licensing practices in response to heavy user protests. Today, tiered pricing, which charges users more for licenses on larger machines, is no longer mandatory on vendors' mainframe, Unix and personal computer software.

Users rebelled against these types of licenses, arguing that moving up to larger machines doesn't necessarily increase the value of the software.

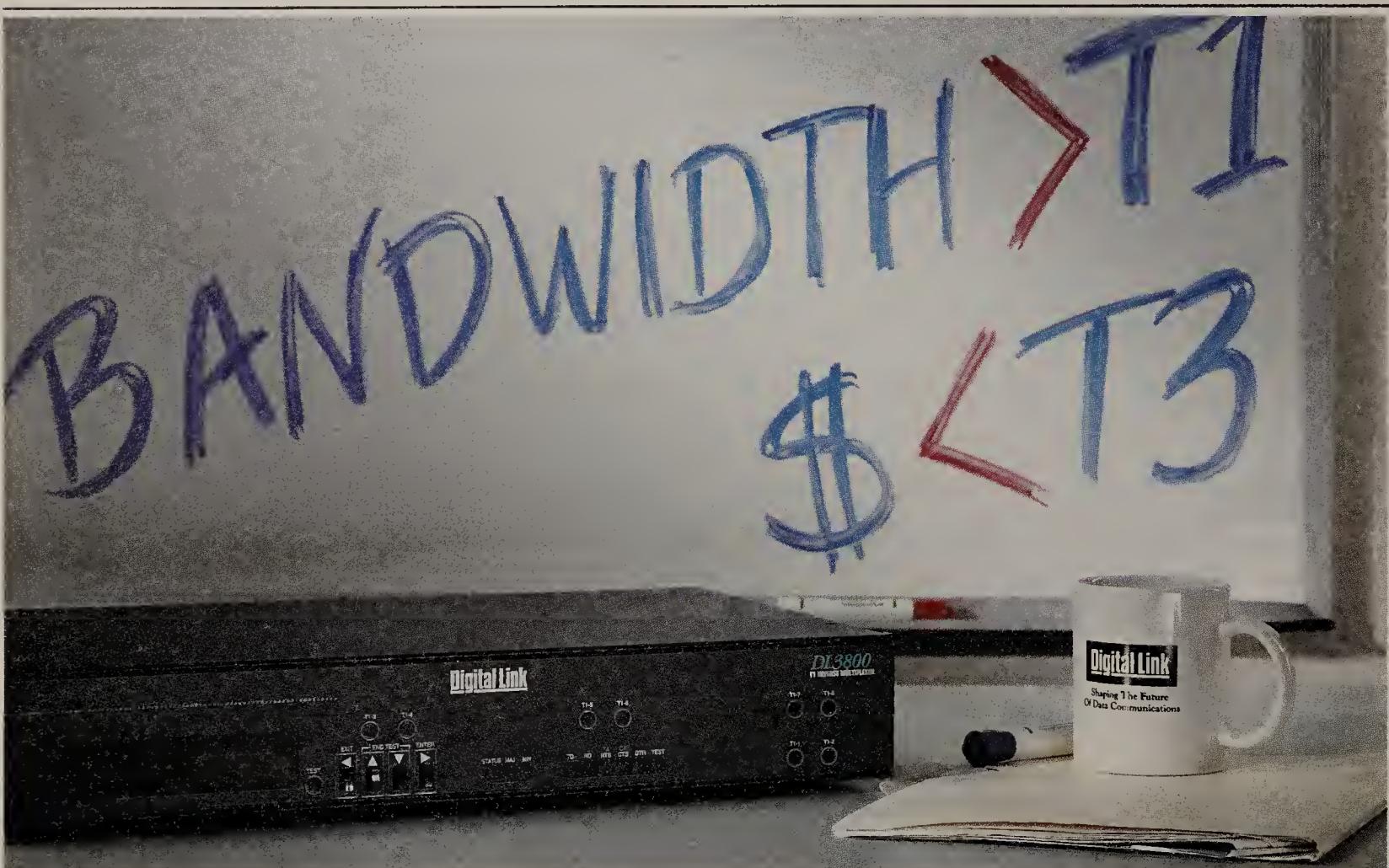
As an alternative to tier-based pricing, CA is offering a so-called enterprise pricing plan under which a company pays one price for corporate-wide use of the vendor's software. For mainframe software, the price is based on total million instructions per second used across single or multiple sites. PC software is priced according to the number of PCs in the enterprise.

"We price according to today's configuration and grant rights that will cover any and all configurations in the future," says Arnold Mazur, CA's executive vice president. Users only pay price increases when they move to a new software version, Mazur says.

That hasn't always been the case. In the past, users took an extra licensing hit when expanding their mainframes, even though the software itself did not change.

Mazur also says CA will offer in the future a new method of distributing microcomputer software. The company plans to deliver software libraries, with all software modules for the taking.

"As you wish to use software, you pull it out of the library. The program will allow (continued on page S28)



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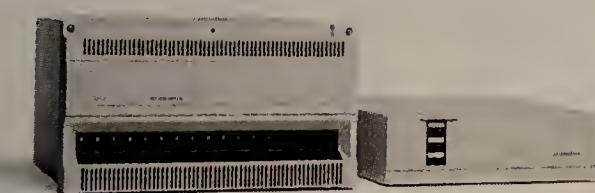
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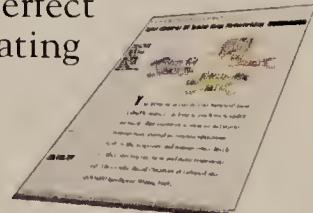
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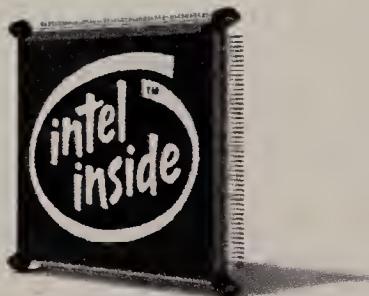
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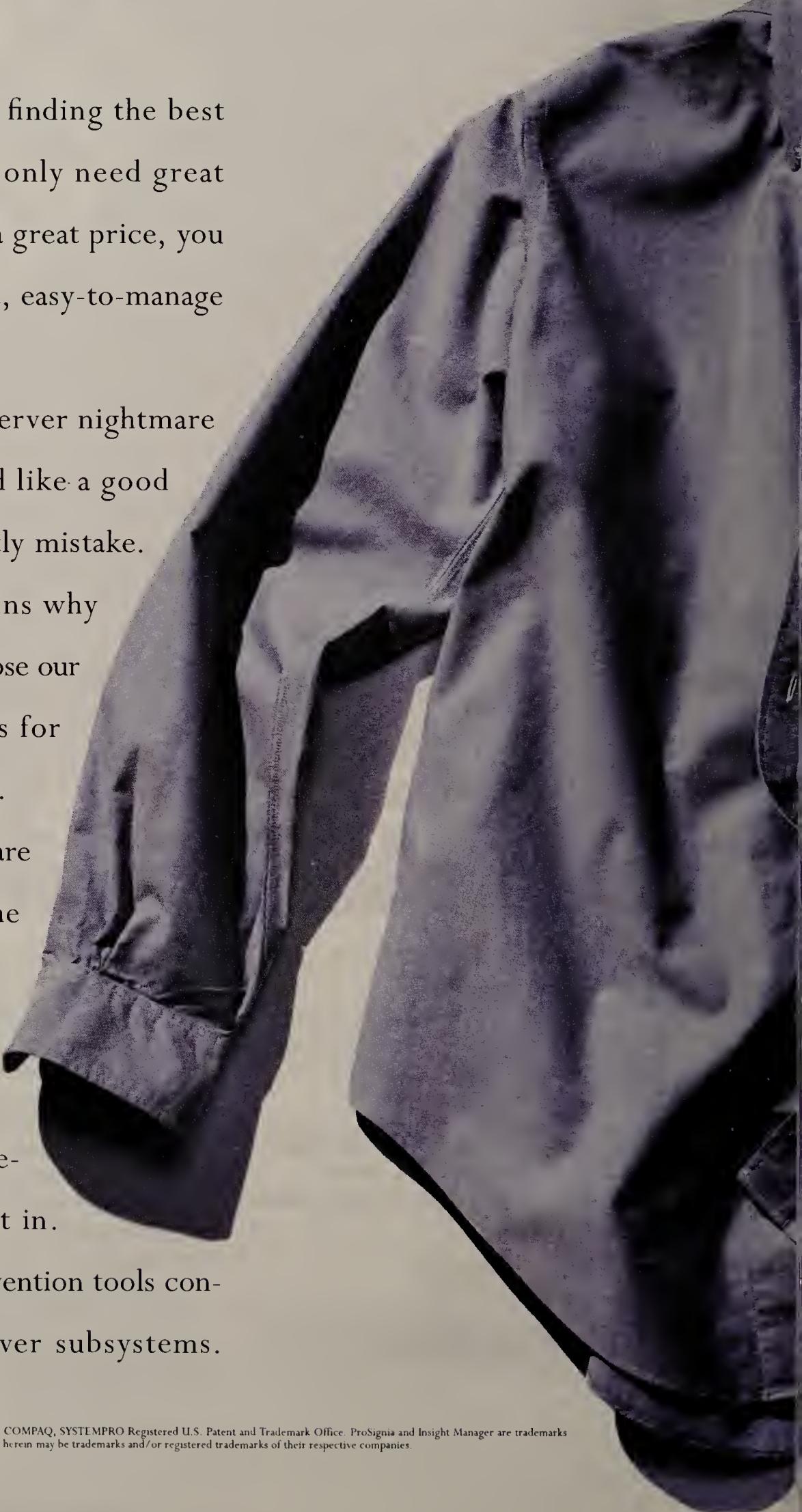
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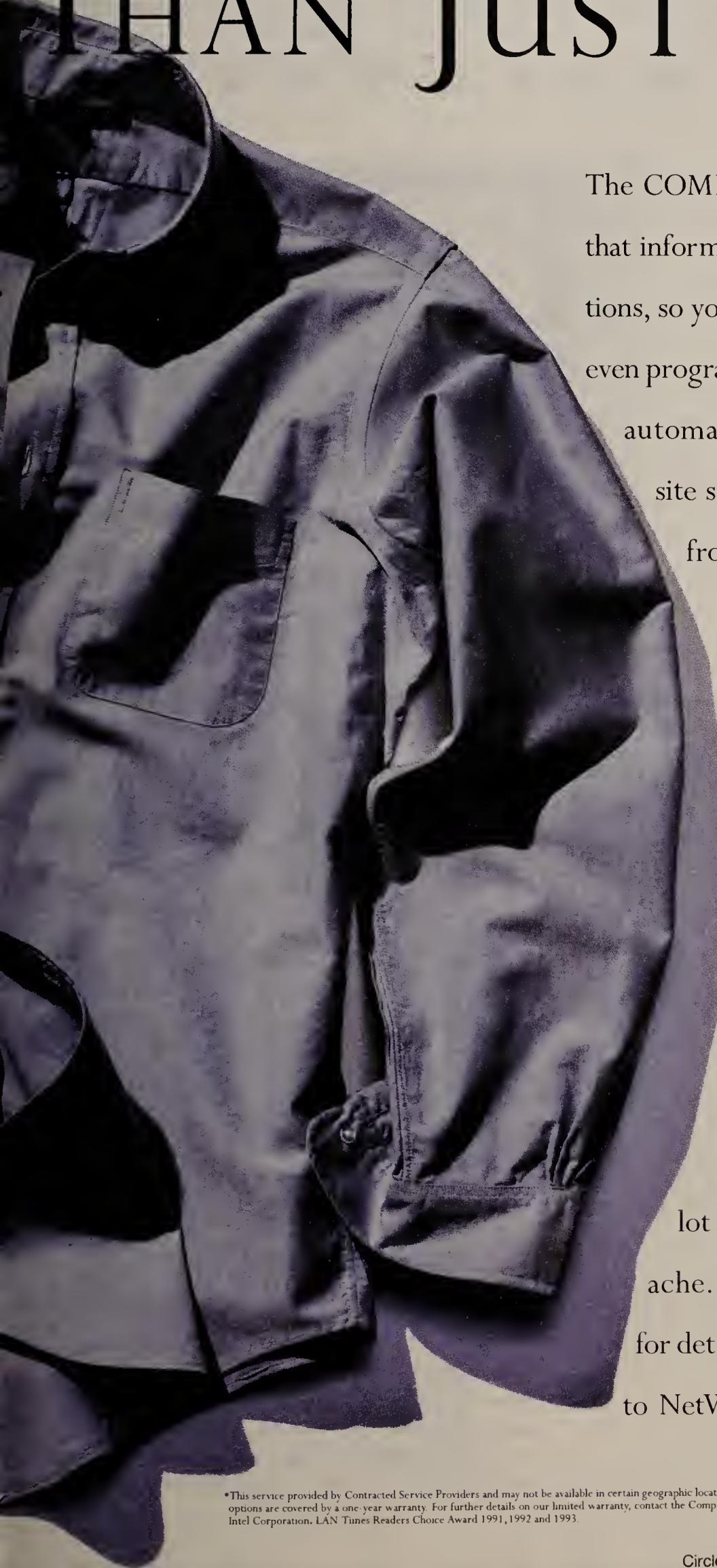
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(continued from page S24)

you to use the whole library, but you won't be charged for something unless you use it," Mazur says. "So we're splitting the pricing from licensing. You're licensed for everything; what you use is up to you."

Such a software vending machine, typically sent out on a CDROM disk, will be the preferred delivery mechanism of the future for vendors that have massive numbers of software products.

No more tiers

DEC has been a leader in the "no-more-tiers" movement. Pricing schemes instituted in 1991 allow users to move software to various DEC platforms without incurring additional fees. DEC offers both concurrent- and per-user licenses for OpenVMS, Ultrix, DEC OSF/1 and Windows NT systems.

Sometime this summer, DEC is expected to announce a software access control product, code-named Omni, incorporating the LS API. Developers will code license calls into their applications. The calls will each generate a request to a license manager, which will distribute a license key giving information about the license.

To run WordPerfect, for instance, a user would type the necessary commands. This, in turn, would make the application generate a call to the license server seeking permission to run the program. The nice part is net managers can set parameters to make certain applications available only at certain intervals, say between 8 a.m. and 6 p.m. If the license server returns a key, the application is allowed to run, provided the user has the correct security clearance. If all available keys are in use, user requests may be put into a temporary queue.

Later this year, DEC will release monitoring and reporting applications that will allow users to also inventory their licenses and track software usage.

At the same time, DEC is committed to supporting the OSF's DME framework, says Marie Reeve, a marketing manager for license management in DEC's Corporate Business Practices Group.

Avoiding conflict

IBM's NetView Distribution Manager (NDM) is one of the more advanced ESD products on the market. Currently, it's the only one that can upgrade operating systems over the network, for example. Not only does NDM have the ability to automatically install itself, but also to test and back the software if it doesn't work properly, says Bob Roth, a manager for IBM's LAN Systems Technical Marketing Group.

IBM has published details of the Configuration/Installation/Distribution (CID) process used by NDM so other vendors' products may be managed by NDM. Over 170 vendors have committed to this, Roth says. However, CID is not competing with any other standards, he notes.

"CID is not important as a standard, nor do I see it emerging as a major standard," says Gartner Group's Dailey. That's because it is restricted largely to Systems Network Architecture, he says.

IBM doesn't have a licensing program but is talking to a number of vendors about working with their products, Roth says.

Another vendor with a similar tool for IBM environments, LEGENT Corp., has offered enterprise licenses for about two

years to selected customers. In May, LEGENT announced DistribuLink, an ESD product that runs on IBM MVS mainframes and uses SNA to deliver software to multi-vendor desktops. It uses LEGENT's XCOM LU 6.2 file-transfer package. DistribuLink shipped in June.

On the verge

Microsoft announced in early 1992 that the LS API would be part of its Windows Open Services Architecture (WOSA). Berry says Microsoft is on the verge of delivering on that promise. LS API will be in Windows NT, as well. The company is also working with the DMTF on MIFFs. DMI will be implemented in Windows and Windows NT this summer, Berry says.

Microsoft has two initiatives under way in the software licensing and distribution arena: Hermes and Plug-and-Play.

Hermes is a centralized desktop management product that includes four integrated functions: hardware and software inventory; software distribution and installation; remote diagnostics and control; and the downloading of applications from servers.

Hermes will give users the ability to create a virtual desktop of applications and services that is portable across workstations. Application and user profiles are stored on the server. Hermes also includes a license control function as part of the software distribution capabilities.

Hermes' central console runs under Windows NT. In the first release, clients can run DOS, Windows or Windows NT. A subsequent release will add Macintosh support. Hermes is extensible, so third parties can add Unix, OS/2 "and even printers and hubs and routers and so on," Berry says.



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NetView®/6000 Version 2 from IBM Networking Systems offers a greater range of management functionality, has an end user interface that keeps things simple, and incorporates OSF™/DME standards. It's a UNIX®-based management platform that runs on RISC System/6000® workstations with IBM's

He adds that Hermes will run on any LAN, including NetWare, any flavor of LAN Manager (OS/2 or Unix) and Windows NT Advanced Server.

The software automatically locates all workstations on the LAN and configures them so they will report their inventory each time a user logs on. Hermes agents will report any changes in memory, disk space, version of the BIOS and other client workstation conditions to a central console. The command to initiate the inventory process goes into the user's network logon script.

The software that runs at the desktop is DMI-compliant and uses MIFFs as defined by the DMTF.

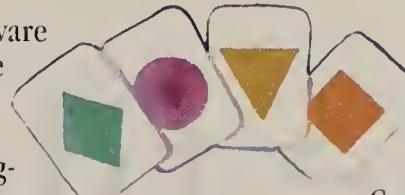
The software distribution component of Hermes actually distributes jobs — with or without accompanying data.

Hermes reflects a trend toward making software and license control a part of overall desktop asset management. There are many advantages to combining desktop management functions in a single product.

For example, Hermes' inventory will include a list of desktop machines, their hardware configurations, and what oper-

ating systems and software they run. Hermes can take advantage of that information, when it distributes software, to preconfigure software for desktop devices.

Hermes may work with applications based on Microsoft's Plug-and-Play specification to keep track of desktop components, Berry says. The goal of Plug-and-Play is to create self-configuring hardware and software, minimizing user involvement with configuration at installation



time. A proposed Plug-and-Play Industry Standard Architecture specification, codeveloped by 14 vendors, including Compaq Computer Corp., Intel and Microsoft, was announced in March at the second annual Windows Hardware Engineering Conference.

Novell's waiting lists

ESL for NetWare will be a network service based on Gradient's NetLS. It's not an end-user product, but code developers can use it to incorporate license control into their programs.

Due by the end of the year, Electronic Software Licensing for NetWare will run on the server as a NetWare Loadable Module (NLM). When ESL gets a request to run an application and a valid license is not available, it can create a waiting list. The application can be launched when a license becomes available.

ESL supports various special types of licenses. For instance, a "node-locked" license allows users to launch the application only from a specific node on the network. A "personal" license limits the use of the application to a particular network identification. A time-specific license allows the application to be launched only during certain hours.

ESL will also monitor the usage of applications and produce reports for administrators. Software developers and end-user programmers will be able to use the LS API to hook programs into ESL.

Novell's ESD software, Network Navigator, will also be implemented as an NLM this year. Network Navigator comes in host-based versions for IBM's MVS and VM mainframe operating systems, as well for Tandem Computer, Inc.'s, Tandem-Guardian 90 operating system. Network Navigator provides configuration and inventory reports, in addition to automated, scheduled distribution of software and upgrades. Software can be distributed directly from the host to the workstation or, alternatively, downloaded to a server running NetWare, Microsoft LAN Manager or Banyan Systems, Inc. VINES.

Down the road

Users and software vendors are moving toward more mutually acceptable pricing structures, licensing agreements and enforcement. ESD products are evolving well beyond copying files into full unattended installation, while taking into account the configuration of the desktop computer.

Clear standards for ESD and ESL, such as NetLS, LS API, MIFFs and DMI, are gaining wide acceptance. Although the standards come from several different groups, they are complementary rather than competitive.

Two cautions: Industry fragmentation is always possible, and APIs and specifications are still relatively new and unseasoned.

Still, all in all, ESD and ESL are maturing. Judging from the stature of the vendors involved and the efforts they are putting forth, the next few years will see increasingly convenient and automated software licensing and distribution. □▽○

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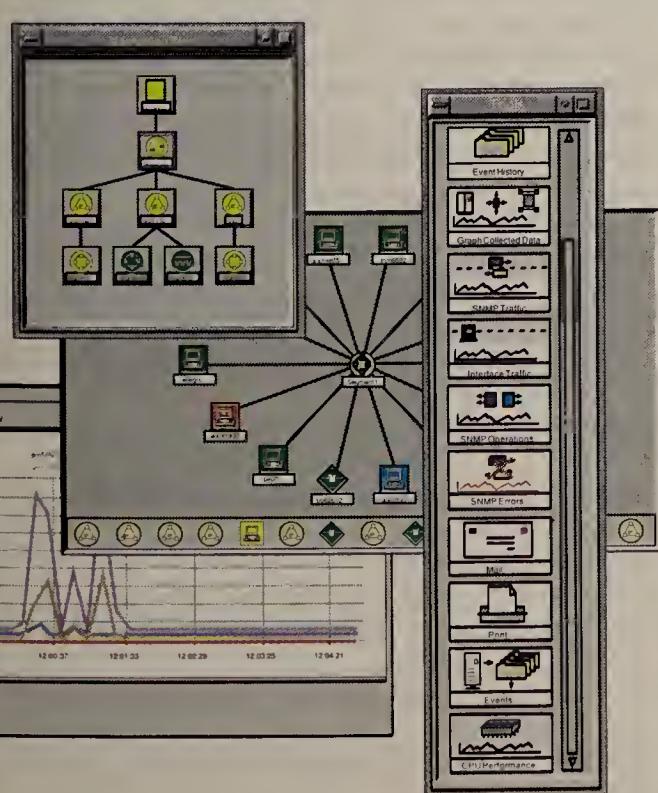
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Hurwitz is a free-lance writer based in Eastsound, Wash.

The file cabinet of the future



CYNDY PATRICK

Today's document and image processing systems are cheaper, easier to use, but several roadblocks remain before users can usher in the totally paperless office.

Although recent breakthroughs in pricing, functionality and ease of use have brought document and image processing (DIP) systems more widespread acceptance, the products still have far to go before they can begin to fulfill the promise of becoming the filing cabinets of the corporate world. Basic questions about standards and the most effective uses of the systems continue to be debated.

A major issue blocking the technology's acceptance, however, is fast being resolved with the arrival in the past two years of low-cost, local-area network-based DIP packages. Many of these new products, available from companies such as ViewStar Corp., Keyfile Corp., Marvin and Watermark Software, Inc., cost just under \$100 per user, are easy to install and are relatively straightforward to use.

With their arrival, DIP has begun to take on the role of a standard utility application, much like word processing, in information systems environments.

While this shift offers users some benefits, it also poses some risks. In order to understand the importance of this new wave of imaging systems, the problems they solve and the problems they raise, a quick review of the evolution of the industry and technology is needed.

From early 1981 until the mid-1980s, DIP sys-

tems were used primarily for storage and retrieval. Systems were marketed on the premise that it's easier to retrieve electronic images from the desktop than it is to store and physically retrieve paper-based files.

At this stage, the technology was relatively expensive and not particularly friendly or flexible. Users were expected to fit the way they conducted business into the parameters of the image system they purchased, and there weren't many choices.

Systems were either stand-alone or mainframe-attached; workstations were proprietary and Unix-based; and software, also proprietary, focused solely on the storage and retrieval of scanned documents.

In order to address this inflexibility, companies such as Integrated Automation, Inc. and other systems integrators implemented custom high-end solutions for their customers. But due to the high cost of hardware, software and integration services — totaling about \$1.5 million to \$2 million per installation — government agencies with deep pockets were the major purchasers of these solutions, while commercial acceptance was relatively low.

Imaging became more accessible to commercial users in 1985, when FileNet Corp. introduced its minicomputer-based system. Although the system carried a price tag of \$500,000 and up, it was less

expensive than a totally integrated system.

FileNet's primary selling point, however, was that it contained the industry's first work flow software. FileNet's WorkFlow enabled users to manage the processes involved in ushering the flow of paper-based documents throughout an organization. This served to shift industry focus away from the automation of paper storage and retrieval and toward automation of the entire process. Still, it was a proprietary, departmental solution.

Toward the latter half of the decade, large companies such as Wang Laboratories, Inc., Plexus Corp. and IBM entered the market, providing stability and respectability. But DIP systems, in general, were still expensive, departmentally focused and minicomputer-based.

By 1988, DIP systems that could run on LANs, such as ViewStar's package and MARS from Microdynamics, Inc., became available. These were still relatively expensive solutions, costing approximately \$100,000 and up, but their success was tied to the market's general acceptance of LANs and by the fact that they operated within standard Ethernet and token-ring environments.

They were still largely proprietary, however, in that they each had their own document indexing databases, which at times were difficult to maintain and manage.

Beginning in 1989, stand-alone personal computer-based DIP systems, such as Wang's OPEN/ (continued on page S32)

BY ALLEN A. HARRIS JR.

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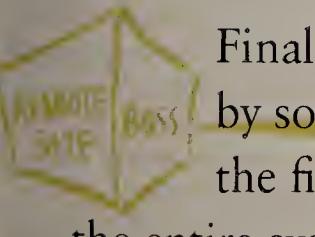
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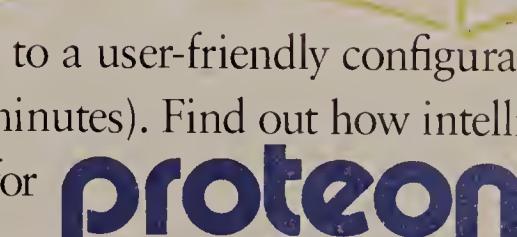
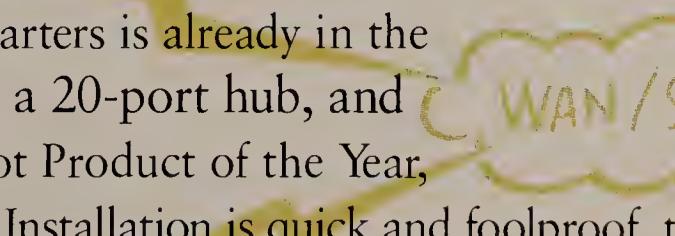
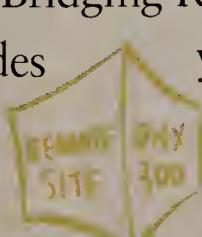




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(continued from page S30)

image Windows, began to appear. These packages usually provided some degree of office automation in addition to simple storage and retrieval of image documents. And like the LAN systems, they ran on standard DOS workstations.

But they were still expensive. At that time, 386 machines were a costly solution, and 286 machines were no bargain either. The 286 required hardware, such as compression and decompression cards, which meant an average image-enabled workstation could cost between \$10,000 and

\$15,000. Therefore, despite the existence of PC-based systems, expense continued to be a significant barrier to the widespread deployment of DIP systems.

Then firms such as LaserData, Inc. and KoFax, Inc. began offering tool kits that allowed users to build their own DIP systems. Although this was a major step away from proprietary imaging solutions, the tool kits required programming knowledge and, often, integrators, which raised costs.

Since 1991, an increasing number of stand-alone and networked DIP packages

have become available in addition to an increasing number of LAN-based DIP tool kits. Many are easy to use and don't require systems integration. Modifying most major systems requires knowledge of C language, but many packages now come with a fourth-generation tool kit, which requires less programming knowledge.

In the past few years, the PC price/performance curve has also improved: The image-enabled stand-alone workstation that was priced at \$15,000 in the late 1980s costs approximately \$3,000 today. Moreover, with the advent of client/server

technology, PCs can be used as servers to efficiently distribute processing power to client PCs in an image environment. Thus, instead of spending \$25,000 to have a minicomputer-based system, users could spend \$6,000 or \$7,000 to configure two or three PCs to act as image servers.

In addition, few of the newer packages use proprietary hardware, positioning this new class of imaging system to take advantage of the shift in corporate computing platforms from mainframes and minicomputers to LANs. The combination of these changes has led users to change the way they use the packages, as well.

In today's corporate computing environment, there are generally four categories of application focus: enterprise, departmental, work group and stand-alone.

In the past, the majority of DIP systems focused on back-office, transaction-based departmental solutions such as credit card, loan and claims processing applications. This was because users could justify the high cost of DIP systems only for these types of high-volume applications, which require as many as 2,000 to 3,000 transactions per day.

The LAN and PC-based systems, however, have allowed the development of applications that can support a variety of business environments, from the entire enterprise to individual workers. Because of the lower cost, these systems are well suited to support front-office, customer service-type applications that may require only 20 or 30 transactions per day.

In short, the reach of the technology has now extended to include virtually the entire working environment. This is good news, but it does force users to deal with some difficult issues.

Some caveats

With the stronger presence and capabilities of image applications, more users are evaluating them for their environments. But now the foremost challenge is deciding when and how to develop a DIP architecture. Should it include the older proprietary technology or the newer LAN-oriented systems?

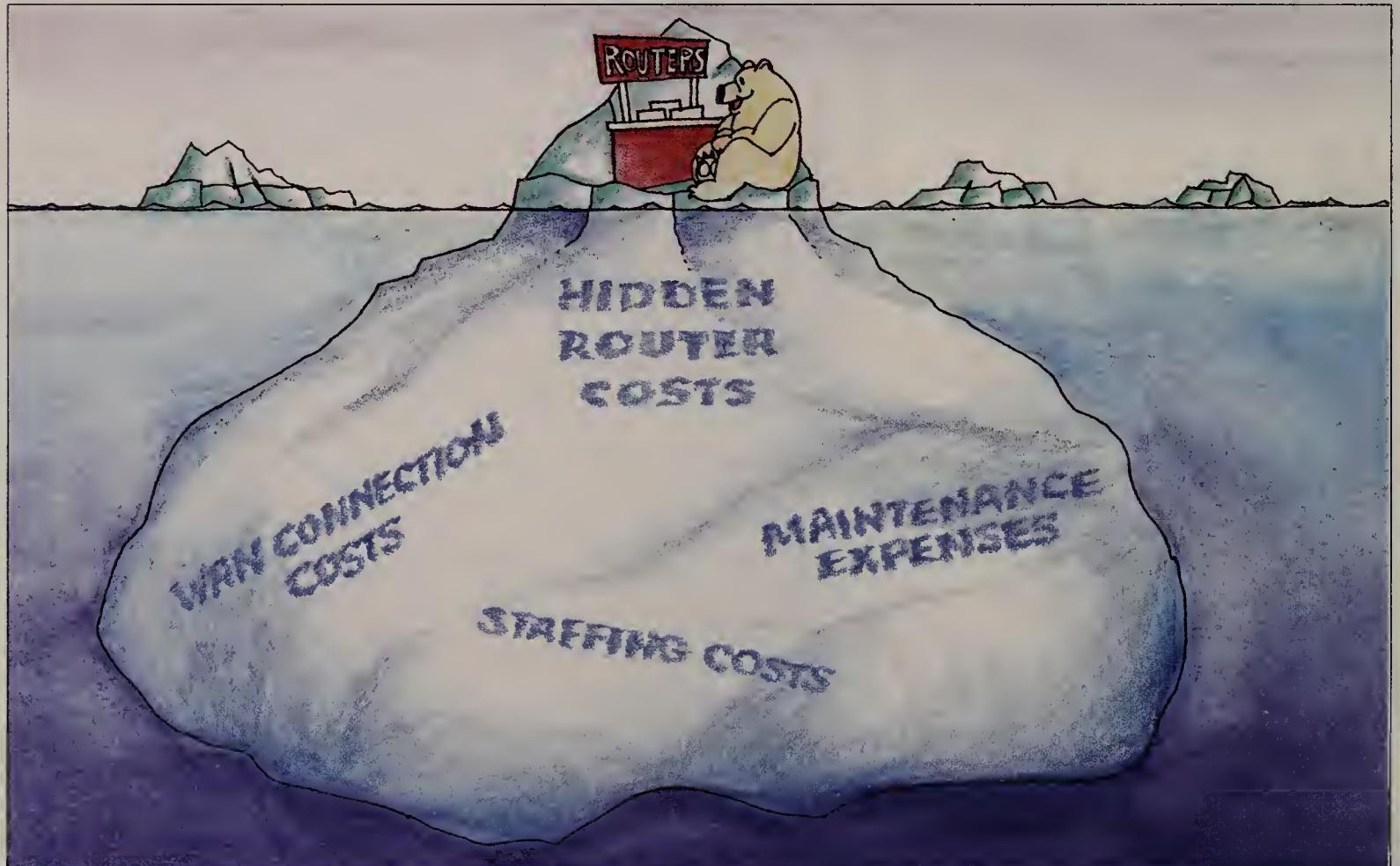
Many organizations grappling with these issues have had to include the proprietary imaging platforms into their future architectural plans to preserve their initial investments in the technology. These organizations, which include a number of large banks, oil companies and manufacturers, are now beginning to set guidelines for the use of imaging in their environments. These range from setting standards for exchanging document images between divergent systems to building guidelines for determining which problems are best solved using imaging technology.

The lower cost LAN systems, such as those offered by ViewStar and Microdynamics, have become increasingly attractive to these large corporate users because they use standard hardware and networks. These systems often don't require new workstations, thus reducing the overall cost of implementing them.

In addition, they are more scalable than their proprietary predecessors, allowing smaller work group systems to grow into departmental solutions.

For example, a typical FileNet system limited users to supporting between 120 and 135 machines per network. Once that

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limit was exceeded, they would need to move the system to a different type of FileNet network. LAN systems, however, can usually support the same number of users as the LAN itself.

One major area of concern for large users when evaluating these newer LAN-based DIP systems is whether they can support multimillion-record document locator databases. Although many vendors have claimed that mainframe-type performance can be achieved by dividing databases among multiple servers, relatively few users have implemented multimillion-record PC client/server systems to date. This lack of a track record leaves users uneasy, making mainframe or minicomputer systems seem more attractive.

Another concern is support. Older and larger imaging vendors such as IBM, DEC and FileNet continue to be viable for many companies because they offer broad support to large corporate users.

Groupware and multimedia

Beyond the basic architectural issues that these lower cost DIP systems raise, there are a host of application and technology questions that are becoming increasingly important.

Two questions asked more frequently are: What should be the central, coordinating tool in the automated office — work flow software or groupware? And with other objects such as voice and full-motion video becoming available as usable data, how important are document images in the expanded mix of data?

The confusion over the role of groupware products, such as Lotus Development Corp.'s Notes vs. the work flow/ work management software available with most DIP packages, comes from the former's ability to utilize document images in its environment and facilitate interaction between groups of workers. But it is mostly limited to some basic messaging functions and best suited to geographically diverse work groups that communicate frequently in an ad hoc fashion.

Work flow software, on the other hand, is best used to automate repetitive processes that can be well defined.

Both software tools can coexist in the automated office. Work flow could be responsible for the coordinated movement of critical information, while groupware could be used to enable the enterprise-wide sharing of information produced through local processing activities. In this work flow/groupware environment, however, it is critical for organizations to select LAN document imaging tools that can take appropriate advantage of both software types.

It appears that Lotus has taken this into consideration in its product development strategy through its partnering with Eastman Kodak Co.'s subsidiary Imagery Software, Inc. and others, but it's not clear that the work flow and DIP vendors have done the same. In the end, this could hobble the work flow and DIP vendors in grabbing a large piece of the imaging market.

On another front, multimedia technology has become available in the last two years and has greatly expanded developers' options in terms of the type of information that can be incorporated into an application. Now voice can be used in conjunction with images, full-motion video

and animation. This expanded list of options has increased the level of confusion about whether DIP is an appropriate technology in which to invest.

In the short term, at least, DIP has its place. Today, most multimedia systems can only be used for stand-alone applications and have a distance to go before they can be managed on a network and shared by multiple users (see "Serving up multimedia," page S10).

Still, the overall question about the long-term value of document images needs to be answered by organizations

hoping to gain maximum leverage from their technology investments. Users need to make some upfront, business-level decisions about their goals for the technology. If they don't, they risk wasting financial resources on applications that could be better supported using other information types, be they multimedia, groupware or something else.

While the cost barrier for large scale DIP system adoption has been overcome, other equally important barriers remain. More experience must be gained from the application of the different classes of DIP

systems to understand fully where they best fit into the emerging new world of information technology.

In addition, the role of multimedia, electronic mail and groupware systems needs to be defined so that users can be more confident in their application and be sure that these new technologies are being used to their full advantage. □▽○

Harris is senior manager at Ernst & Young's National Enabling Technologies unit in New York. He can be reached at (212) 773-5446.

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As they seek to accommodate today's high-bandwidth LAN applications, network managers are gauging the viability of emerging high-speed LAN contenders such as ATM, FDDI and Fast Ethernet. Betting on a winner in the fast LAN market, however, depends heavily on the applications a company needs to support.

For example, in a growing number of firms, new applications, such as graphics, imaging, multimedia and video, are choking the corporate local-area network.

"During the past 10 years, technical advances increased computer CPU processing power and memory 50- or maybe even 100-fold," says Jack Moses, a vice president at Grand Junction Networks, Inc., a high-speed Ethernet vendor in Union City, Calif. "Yet network transmission speeds have remained constant. In many cases, users now need more bandwidth to get their jobs done."

In order to overcome network bottlenecks, higher speed connections can be situated in either of two places. Data-intensive work group applications, such as computer-aided design and manufacturing, stipulate that extra bandwidth be funneled into the LAN linking each user's workstation. In other cases, however, the bigger pipes are needed only on the backbone networks that move information among a number of LANs.

"If 10 Ethernet networks feed one Ethernet backbone, the backbone can quickly become saturated," says Doug Gold, director of communications research at International Data Corp. (IDC), a Framingham, Mass., market research firm.

Since desktop and backbone requirements differ, the three high-speed technologies — Asynchronous Transfer Mode, Fiber Distributed Data Interface and Fast Ethernet — possess features that are well suited to some applications and ill suited to others.

"Right now, users are confused because vendors are making a number of contradictory claims about their technologies," says Lawrence Gasman, president of Communications Industry Researchers, Inc., a Washington, D.C. consulting firm.

The big attraction

High-speed Ethernet proponents are trying to piggyback onto the success of their low-speed brethren. Low-speed Ethernet has become the world's most widely deployed network topology: IDC estimated that in 1992, there were more than eight million Ethernet connections on personal computer LANs. Because traditional Ethernet has been commonly implemented, network technicians are comfortable with it and understand how to install and manage it.

A second attraction is cost: Traditional Ethernet adapters cost only a few hundred dollars. Ethernet runs on unshielded twisted-pair wiring, which is the least expensive wiring media. Unshielded twisted pair also makes it sim-

ple for corporations to add or move LAN users because these kinds of installations are based on a configuration in which a central hub links the various LAN desktops. If a connection needs to be moved or added, administrators only have to change the affected wire. In LANs that don't use hubs, the entire network must be taken down in order to add just one new connection.

Until last summer, Ethernet's transmission speed of 10M bit/sec was viewed as absolute. At that time, vendors began to outline techniques based on unshielded twisted-pair wiring that increased the transmission speed tenfold.

"Customers have invested a lot of time and money in Ethernet and want to leverage those investments," says Grand Junction's Moses.

High-speed Ethernet promises to let them keep much of their existing equipment and expertise. Also, high-speed Ethernet products are expected to be relatively inexpensive, with vendors touting prices of \$600 per adapter card (see graphic, page S36).

Jumping the hurdles

But high-speed Ethernet backers must overcome three obstacles. First, no vendor has yet shipped one of these products. According to Moses, his company expects to ship high-speed Ethernet adapter cards by the end of the year, and he predicts that other suppliers will also have them available then.

A second limitation is distance. High-speed Ethernet connections must operate within 100 meters of a central wiring closet. Consequently, the technology is not suited to backbone networks, which often span thousands of meters.

"We are focusing on desktop connections," Moses says. "A small part of our business will be for backbone networks because other technologies, such as FDDI, are better suited to that requirement."

The third limitation is more difficult to dismiss. Currently, vendors are warring over a high-speed Ethernet standard.

"Users are quickly losing interest in high-speed Ethernet because of the outstanding standards issues," says Paul Callahan, a senior analyst at Forrester Research, Inc., a Cambridge, Mass., consulting firm.

The Institute of Electrical and Electronics Engineers, Inc. is trying to mediate between two factions. One group, led by 3Com Corp. and SynOptics Communications, Inc., is pro-

(continued on page S36)

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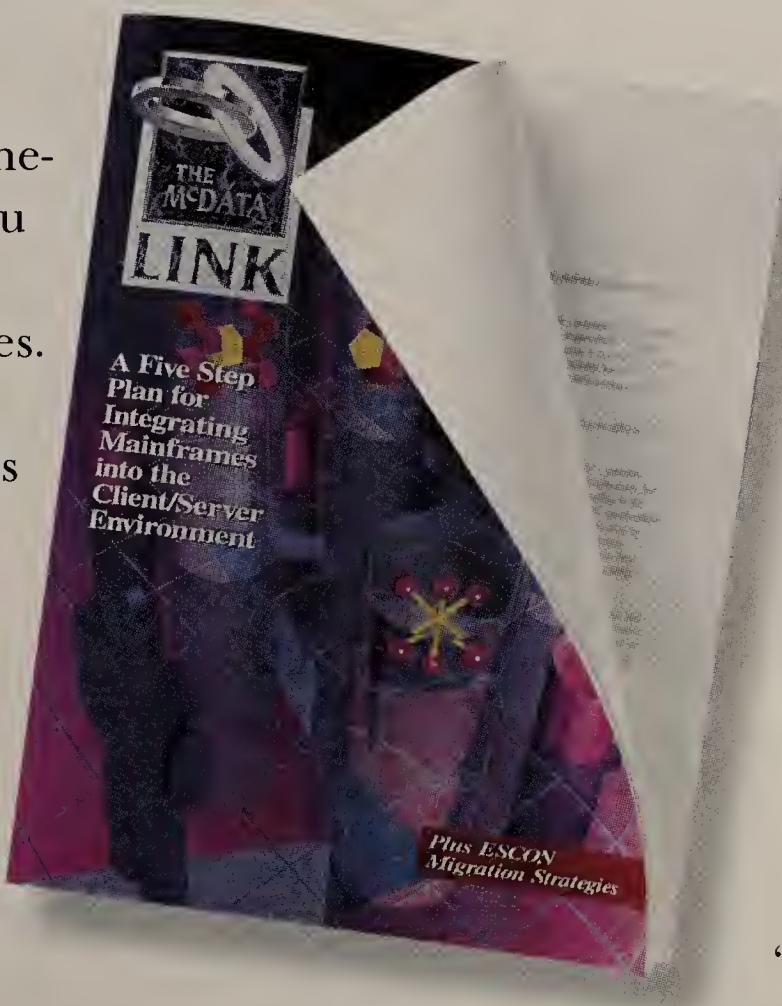
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(continued from page S34) posing to keep much of the 802.3 standard the same. A second group, led by Hewlett-Packard Co. and AT&T Microelectronics, wants to change the media access control layer, which regulates how information is sent over a network. The HP-AT&T group would replace traditional Ethernet's carrier-sense multiple access with collision detection signaling protocol with a new scheme called Demand Priority with Quartet Signaling.

As of this writing, the IEEE had not yet made a decision, although it is expected to issue a recommendation this month.

While users would prefer one standard, there is a distinct possibility that two could emerge. "I think high-speed Ethernet acceptance would be hurt if the IEEE issued two standards," Callahan predicts.

Others concurred. "Right now there's been a lot of hype about 100M bit/sec Ethernet, but there is a lot of confusion because no one is sure when the products will be delivered or how compatible they will be," says Erik Murrey, manager of software applications at Network Systems Corp., an internetworking vendor in Fremont, Calif., that decided against high-speed Ethernet in favor of FDDI in a new LAN installation.

Using ATM

Another high-speed contender, ATM, is an emerging technology with many appealing fea-

"Because ATM supports a range of transmission speeds, it could have a life cycle longer than other technologies."

tures. It uses a cell switching transmission mechanism that is more efficient than circuit switching, found in multiplexers today, and frame relay, which is gaining popularity.

Cell switching can carry voice, data and image information on one line, whereas circuit switching maxes require separate lines to carry different types of information. In addition, ATM cell relay uses fixed 53-byte cells, compared with frame relay transmission, where length varies from packet to packet. Because packet length is fixed, cell relay switches do not read as much information as frame relay switches and can move data along more quickly.

ATM is designed to support

transmission speeds from 50M to 622M bit/sec. That flexibility has attracted the Pacific Stock Exchange, Inc., a financial services firm in San Francisco. The company is examining ways to link its San Francisco and Los Angeles offices, which support four LANs and 300 users.

"Many technologies become outdated after a couple of years," says David Eisenlohr, vice president of telecommunications at Pacific Stock Exchange. "Because ATM supports a range of transmission speeds, it could have a life cycle longer than other network technologies."

The firm plans to test ATM products during the year and make its decision before year end.

A unique ATM feature is its LAN and wide-area network capabilities. "Many network problems stem from linking LANs to WANs," says IDC's Gold. "Because ATM supports both, users can expect tighter integration and simpler management."

But ATM has its problems. First, the technology is fairly new. Although work on ATM standards has been under way since the mid-1980s, it didn't gain much momentum until 1990, when the Consultative Committee on International Telephony and Telegraphy chose it as the standard mechanism for broadband Integrated Services Digital Networks in 1990. At present, the standard is still only about 80% complete.

New technologies face common problems. For example, the cost of ATM connections is comparatively high. Initially, Network Equipment Technologies Inc., a Redwood City, Calif., ATM supplier, sold its adapter cards for approximately \$4,500 but cut the price by 40% in June. However, the price tag is still much higher than FDDI and Fast Ethernet adapters (see graphic, this page).

Also, only a handful of companies are shipping ATM wares. "Users have to separate who has products from who is pushing vaporware because not all of the advertised products are even close to being available," Eisenlohr says.

Compatibility is another issue. "There is a real question about the interoperability among ATM products, and that question will only be answered when more products are available for testing," says Communications Industry Researchers' Gasman.

Network amenities are missing, too. "A lot of pieces are missing with ATM, especially in the area of network management," says Sam Shuler, communications strategy manager at Texas Instruments, Inc. in Austin, Texas, which has tested some ATM products. He adds that this isn't

surprising because it's difficult to build management applications for a new technology until products are available and being used in real-life configurations.

What about FDDI?

FDDI, on the other hand, has an edge — it's not as new as the other two. Work began on the standard in 1982, and it is the most widely deployed of the three high-speed network options. "Recent interest in ATM and high-speed Ethernet has actually helped FDDI," says Burt Williams, a product marketing

ary 1992 and was completed a few months later. As part of one test, Soulsby flooded the network with 38 years of flight information. "Only 7 bits of data were corrupted, which was phenomenal," he adds.

Cost still a problem

Price has been FDDI's most significant shortcoming, however, with connection costs measured in thousands of dollars. In some areas, vendors can do little to lower the price tag. FDDI's redundancy means increased complexity and more sophisticated,

abling users to make changes to the LAN without taking down the whole network.

While FDDI prices have dropped, some observers think more cuts are needed. "Vendors seem to be coming to their senses on FDDI pricing, but the products will only sell in large volume when prices drop to the \$595 to \$695 range," says Forrester's Callahan.

Others disagree. "If one looks at cost in terms of dollars per megabit per second, FDDI is a very attractive technology," Williams says.

The current availability of FDDI products could prove to be a big boon. "After a company spends \$500,000 to install an FDDI network, the network manager will not go back to his boss and say, 'Let's rip it out and put in a more modern technology, such as ATM or high-speed Ethernet,'" Gasman notes. "If that occurred, he would be shot on the spot."

But not everyone agrees that FDDI will gain market momentum. "FDDI has seen its best day; the technology does not work well with multimedia applications," says IDC's Gold. "ATM, with its scalable speeds and ability to run in LANs and WANs, is more in line with users' future requirements and will be more widely accepted."

What about all three?

Others are optimistic about the eventual acceptance of all

Pluses, minuses of high-speed LAN schemes

Technology	Pluses	Minuses	Adapter card prices	Availability
ATM	Works on LANs and WANs	Relatively new	\$2,500	Limited
FDDI	Redundancy	Difficult to install	\$2,000	Generally available
FDDI STP	Works with IBM	Losing customer interest	\$1,500	Limited
CDDI	Runs on copper	Distance limitation	\$800	Limited
High-speed Ethernet	Ethernet similarities	Standards unresolved	\$600	None

GRAPHIC BY SUSAN SLATER

SOURCE: PAUL KORZENIOWSKI, MELDEN, MASS.

manager at SynOptics, which plans to sell products supporting all three high-speed technologies. "Users no longer view FDDI as a new, unproven technology."

FDDI, which operates at a speed of 100M bit/sec, is based on token-passing technology, which is used on 4M and 16M bit/sec token-ring LANs. One difference between the lower speed token-ring networks is FDDI uses a dual-ring topology. This increases reliability: If one ring encounters a problem, the second remains in operation.

The redundancy makes FDDI an alluring backbone technology. In October 1991, USAir Group, Inc., an airline based in Arlington, Va., searched for a backbone to connect 53 IBM Token-Ring LANs supporting 700 users at a new airline terminal in Pittsburgh.

"Our main buying criteria were high speed and fault tolerance," says Ron Soulsby, a senior systems engineer at USAir. "At the time, FDDI was the only technology that could meet them."

The airline evaluated products from Cabletron Systems, Inc.; a team from Cisco Systems, Inc. and SynOptics; FiberCom, Inc.; and Fibronics International, Inc. Fibronics, which is located in Hyannis, Mass., won out because it supplied an integrated system and had network management software that ran on IBM's OS/2 operating system.

"We are an IBM shop and wanted to use OS/2 rather than Unix for network management," Soulsby says.

The installation began in Janu-

higher priced components than simpler network topologies, such as Ethernet.

But in other areas, vendors have made changes to lower FDDI's cost.

Initially, the technology was designed to run only on fiber cabling, which is expensive. Vendors attempted to cut the cost by supporting other media. In the summer of 1991, a group of vendors outlined specifications for sending FDDI data over shielded twisted-pair wiring, which is commonly used to connect terminals to IBM mainframes. This put FDDI connections in the \$1,500 price range.

However, users are moving away from these IBM technologies, so the future for this version of FDDI appears dim. "We don't think that, long range, [shielded twisted pair] will be the prime choice for customers," notes SynOptics' Williams.

Interest is also waning because products that support FDDI over unshielded twisted-pair media — which is the cheapest and easiest medium to operate — are emerging. Network Systems began searching for FDDI products two years ago when it needed to move information among five high-powered Sun Microsystems, Inc. SPARCstations.

For the power users, Network Systems opted for copper connections from start-up supplier Crescendo Communications, Inc. of Sunnyvale, Calif. "Making adds or changes with copper connections is simpler than with other types of media," explains Network Systems' Murrey, because they also run to a central hub, en-

"If one looks at cost in terms of dollars per megabit per second, FDDI is a very attractive technology."

abling users to make changes to the LAN without taking down the whole network.

While FDDI prices have dropped, some observers think more cuts are needed. "Vendors seem to be coming to their senses on FDDI pricing, but the products will only sell in large volume when prices drop to the \$595 to \$695 range," says Forrester's Callahan.

Others disagree. "If one looks at cost in terms of dollars per megabit per second, FDDI is a very attractive technology," Williams says.



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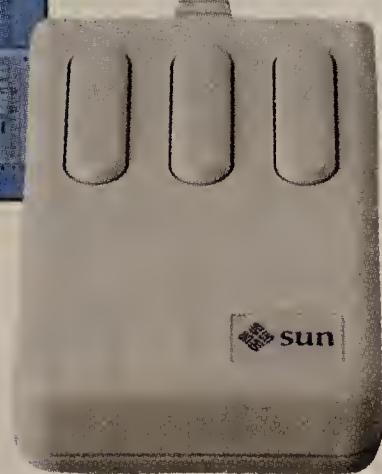
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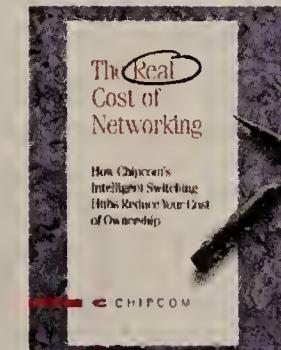
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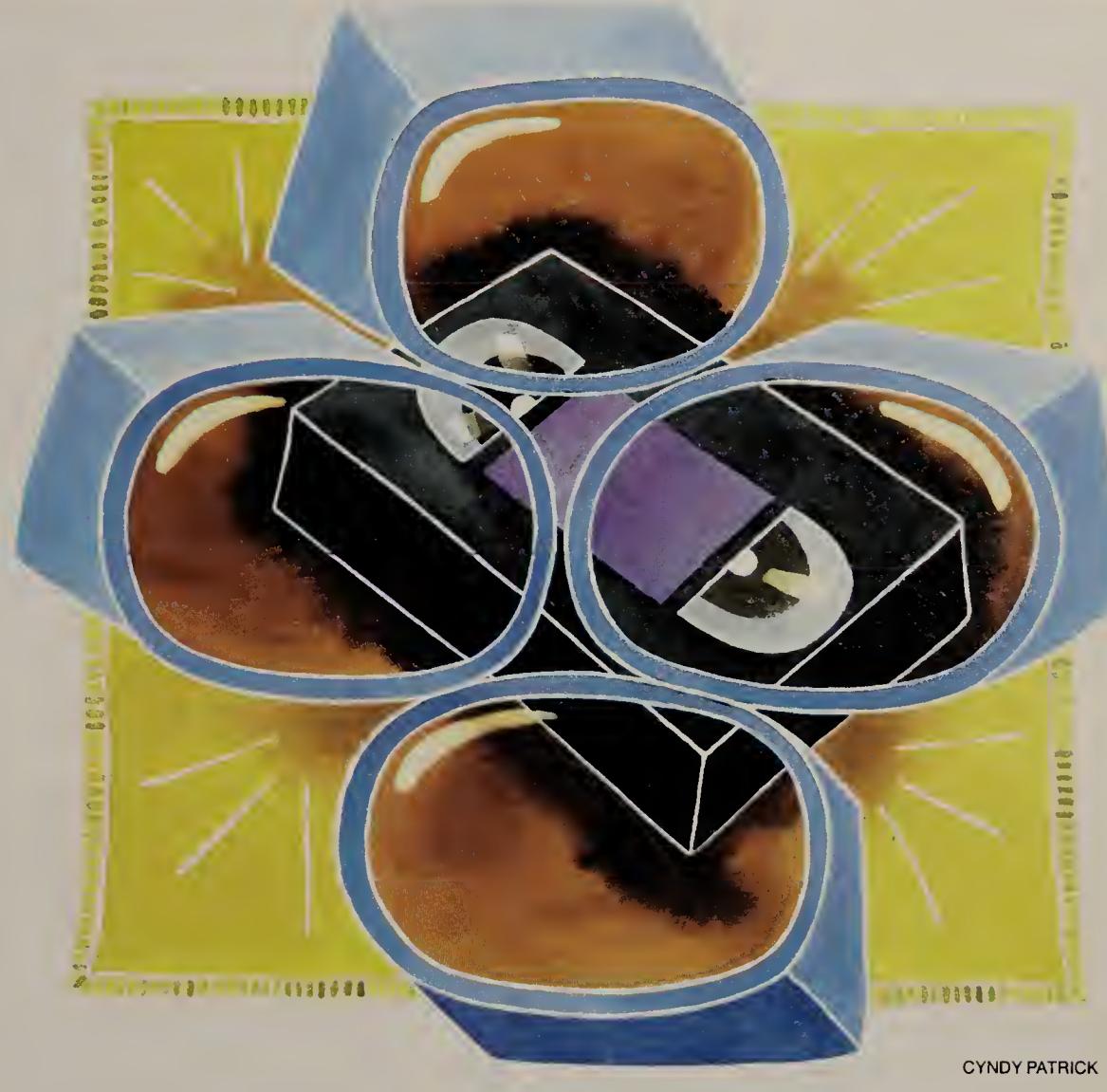
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Fast forward to LAN-based video



CYNDY PATRICK

Enabling users to view the latest films via the corporate LAN is probably not at the top of most network managers' priority lists.

But with recent strides in networking technology, several companies are beginning to evaluate video applications ranging from information kiosks and factory floor instruction to video clip art and live CNN broadcasts to the workstation.

The ability to support these strategic applications over existing local-area networks is crucial for the initial acceptance of networked video, according to analysts. Like any other application category, video must accommodate existing computing infrastructures as much as possible in order to gain widespread use.

The problem, however, is that existing LAN technology is not designed to carry synchronous traffic such as video. LANs transmit packets of data in irregular bursts, whereas video traffic requires the consistent transmission most commonly associated with today's circuit-switched networks.

"The fundamental question for the future of video is whether it will be delivered in a packetized form or an isochronous form," says Tom Nolle, president of CIMI Corp., a Voorhees, N.J.-based market research and consulting firm.

Isochronous networks provide the best medium for carrying video, but they also require the most changes to current network topologies. For example, all the network protocols would have to change and, therefore, all the software applications tied to those protocols would have to change, as well. Thus, in the short term, the cost of moving to new technology might outweigh the benefits, Nolle says.

Packetized video, however, is easier to implement because the video traffic appears to the network like any other type of data. But there is a concern about quality, particularly for teleconferencing, he says.

Asynchronous Transfer Mode (ATM) may be the answer, in part,

because it can handle both packet-based data traffic and isochronous traffic such as video. However, the transition to ATM is likely to take place over many years, and LANs are likely to remain dominated by today's technology for the foreseeable future, he says.

Cheap wisdom

Because the future of networked video is still unclear, users should avoid solutions involving major network changes that will be useful only for supporting video, according to Nolle.

"Users should go with the cheapest, sleaziest solution because they're going to throw it out [later]," he says. "We don't know where video is going. The user's objective should be that any changes to horizontal wiring have to have general utility. That limits your throwaway risk."

One trend involving existing LAN technology is turning out to be a boon for LAN video. In order to squeeze out more bandwidth, users are beginning to configure Ethernet LANs with a single workstation per segment using hubs and inexpensive wiring.

This scheme removes contention from Ethernet segments and guarantees enough bandwidth to the desktop for video. With each segment having access to the entire 10M bit/sec of the Ethernet's bandwidth, users can easily support typical compressed video applications, which require about 1M to 3M bit/sec throughput.

This wiring configuration is likely to provide a stable enough environment for one-way video networking. One-way networked video consists of retrieving stored video or receiving a live broadcast, whereas two-way video consists of applications such as teleconferencing.

Products from Fluent, ProtoComm, Starlight offer users the first step to full-motion video LAN capability.

Two-way video may cause the most problems because transmission delays typical of LANs can make video-based conversations difficult.

Anyone who has had an overseas telephone conversation that was routed via satellite knows how annoying the delay can be. At least with the telephone network, the delay is consistent and people can become accustomed to it. Imagine if the delay was unpredictable.

But one-way video is less demanding since response time is not an issue. And while two-way video over LANs is still in the lab for the most part, several vendors currently offer products that provide one-way LAN video.

"In the world of data nets, multimedia is stored video," says Ames Abbot, director of channels marketing for Fluent, Inc. of Natick, Mass., a vendor specializing in adapt-

ing video to LANs.

According to Abbot, there are four categories of applications for one-way playback of video to the desktop: education, primarily for kindergarten through high school; corporate and just-in-time training; public information services, such as video (continued on page S40)

BY ERIC SMALLEY

(continued from page S39)

kiosks; and video messaging, in which video is used to annotate or illustrate business documents.

Others following suit

In addition to Fluent, two other small companies, ProtoComm Corp. of Trevose, Pa., and Starlight Networks, Inc. of Mountain View, Calif., specialize in adding video to existing LANs.

ProtoComm and Fluent offer products specifically for Novell, Inc. NetWare networks, while Starlight's product can oper-

ate with any LAN data protocol.

Apple Computer, Inc. and Sun Microsystems, Inc. are also exploring video over LANs, although neither company has released a product. IBM has demonstrated video over Token Ring using its Ultimedia video-enabled personal computers (see "Serving up multimedia," page S10), and Digital Equipment Corp. offers a videoconferencing product that operates over Fiber Distributed Data Interface networks.

Intel Corp., DEC and NCR Corp. are among the licensees of Fluent's technology. To date, no companies have licensed

ProtoComm or Starlight technology.

In June 1992, Fluent and ProtoComm teamed to combine their technologies. Fluent developed a scheme for reducing the number of frames per second of a video stream according to the available bandwidth on the LAN. ProtoComm developed a means of storing and retrieving video on a NetWare file server.

Since then, however, ProtoComm has filed a lawsuit against Fluent, claiming Fluent violated their agreement, and Fluent has filed a countersuit. The companies declined to comment further, and the suits

were still pending at press time.

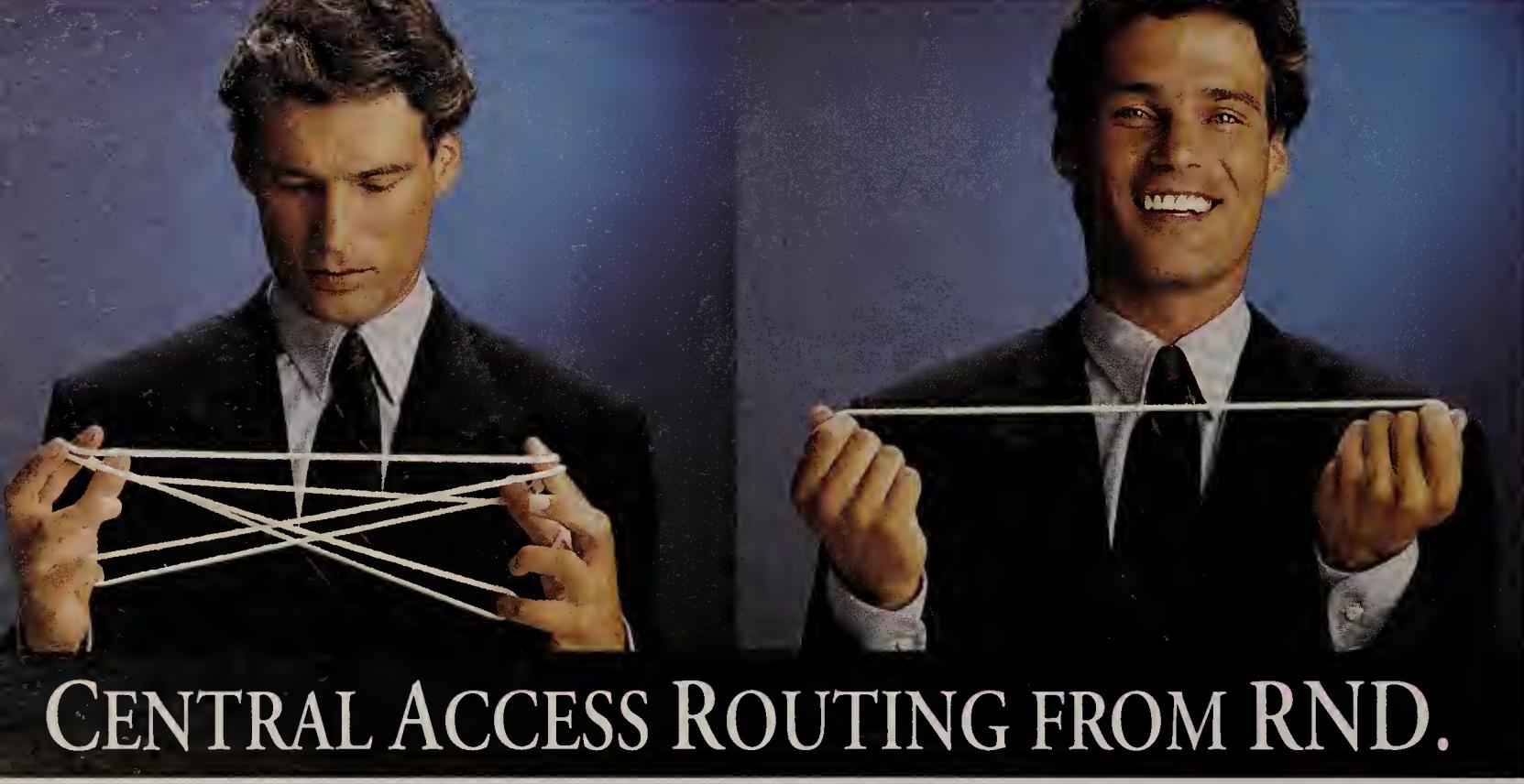
Fluent calls its client/server video management technology "scalable video," Abbot says. Video files consist of interleaved audio and video information and some synchronization information, he explains.

"We parse video files to separate the video and audio, and deliver audio with priority," he says. "We then take the video frame rate and vary it according to available bandwidth."

If the available bandwidth on the shared Ethernet is suddenly diminished by other applications or a large number of users, Fluent's software drops out some of the frames from the video stream. Using a time-stamp system, the unaffected audio track is kept synchronous with the slowed video, Abbot explains.

In most cases, the degradation in video quality is imperceptible, Abbot claims. Standard full-motion video is 30 frame/sec, but "most people perceive motion video at about 16 frame/sec," he says. Thus, when Fluent's software scales back the vid-

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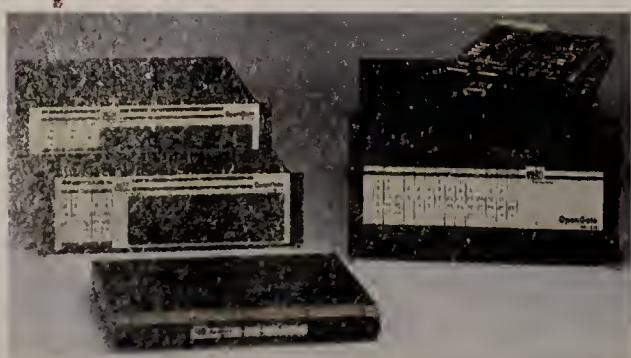
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"We parse video files and deliver audio with priority. We then take the video frame rate and vary it according to available bandwidth."

eo below 30 frame/sec, the quality is not critically impaired, Abbot says.

Sound is another story. Abbot cites work at the Massachusetts Institute of Technology Media Lab that reveals that people are more sensitive to disruptions in audio than to disruptions in video. That's why Fluent concentrated on keeping the audio track intact.

To preserve service quality, however, Fluent recommends no more than six users share an Ethernet segment and no more than eight share a token-ring segment.

Fluent's product, called FluentLinks, is a NetWare Loadable Module (NLM) that enables users to scale the video and control the traffic between the server and workstations, according to Abbot. FluentLinks costs \$5,995 for a 10-user license and \$9,995 for a 28-user license.

ProtoComm

ProtoComm has also developed an NLM that allows a NetWare file server to store video files. The NLM works as a broadcast or multicast server by forwarding live video feeds over the network, according to Dan Heist, ProtoComm's founder and chief technology officer.

Heist will be moderating a panel at INTEROP 93 Fall on how to implement desktop video. The panel will focus on networking, he says.

In addition, ProtoComm has developed client software, a television viewer that operates under Microsoft Corp.'s Video for Windows, which is software that lets users view video within a window on their screen, Heist says.

The software enables users to view the (continued on page S42)

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(continued from page S40)

live video feeds from the server. ProtoComm's products, together called VideoComm, operate over Ethernet, token ring or FDDI, according to Heist.

The VideoComm "basepack" for five users costs \$3,800. A 10-user "highpack" costs \$6,300, and a 25-user highpack costs \$12,000. ProtoComm is beta-testing a 64-user version. "It's not clear there's a big market for that," Heist says. "I doubt it'll be out this year."

Starlight has taken a different approach to adapting video to LANs. Rather than op-

erating under a specific protocol suite, such as Novell's Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX), Starlight developed its own video transport protocol.

"There aren't any data protocols that handle the streaming" necessary for transporting full-motion video, says Barbara Baker, marketing manager for Starlight.

Starlight uses off-the-shelf hardware, including 486 Extended Industry Standard Architecture computers, to configure its video servers. The company also requires users to star wire their workstations using

Ethernet hubs and recommends that no more than four or five users share a single segment.

StarWorks shines

Starlight's software, called StarWorks, consists of both server and desktop components. The server software handles storage, session and stream management. Storage is based on a disk drive array and a streaming algorithm developed by Starlight, according to company officials. The desktop software uses Starlight's transport protocol to receive video information

from the server without disrupting existing protocols and operating systems.

Rather than degrading the video frame rate as bandwidth diminishes, StarWorks prevents additional users from accessing the server — in essence, providing a busy signal.

StarWorks supports DOS, Windows and Macintosh clients, and is compatible with the Intel-IBM Digital Video Interactive, Apple QuickTime, Microsoft Audio Visual Interleave, and the Motion Picture Experts Group and Joint Photographic Experts Group applications, Starlight officials say. The release of StarWorks Version 1.5 in March added support for Video for Windows and QuickTime for Windows.

StarWorks is sold by server capacity. StarWorks 25, which supports video streams that can total up to 25M bit/sec, costs \$18,495. StarWorks 12 costs \$9,950. The number of users supported depends on the type of video running, Starlight's Baker says. Most video formats operate at 1.2M bit/sec. Therefore, StarWorks 25 supports as many as 28 users and StarWorks 12 supports up to 10 users. Starlight is working on substantially increasing the number of users supported, according to Baker.

Users will see that it would probably be wise to go with packet-based video and existing network technology in the short term.

One challenge for users and vendors of networked video is carrying video traffic over internetworks. Bridges and routers add complexity to the LAN environment: Internetworking devices add delay, and routers, which manage the flow of traffic, can add to the inconsistency of the traffic across the network.

"There are all kinds of issues in terms of congestion and throttling," Baker says. "Do you want video to have priority over data [for instance]? We're working on [internetworking software], but we have no products yet."

Although the future of networked video is still unclear, 1993 is shaping up as a pivotal year, according to industry observers.

"I think there'll be a revolution in packet video in the next year," CIMI's Nolle says. Due to the higher cost and limited availability of initial ATM products, users will see that it would probably be wise to go with packet-based video and existing network technology in the short term.

But whichever way the network technology goes — packet-based or isochronous — the future of networked video applications is too uncertain to predict, he says.

"Longer term, it's the old story of groping for the elephant — the big video market is still under the tent," Nolle says. □▽○

Smalley is a Boston-based free-lance writer.

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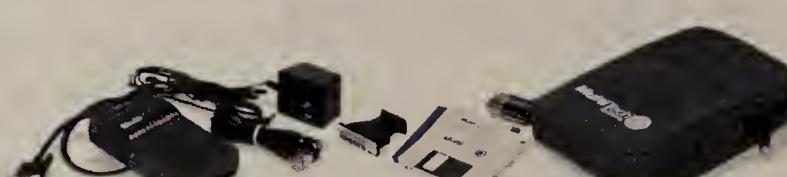
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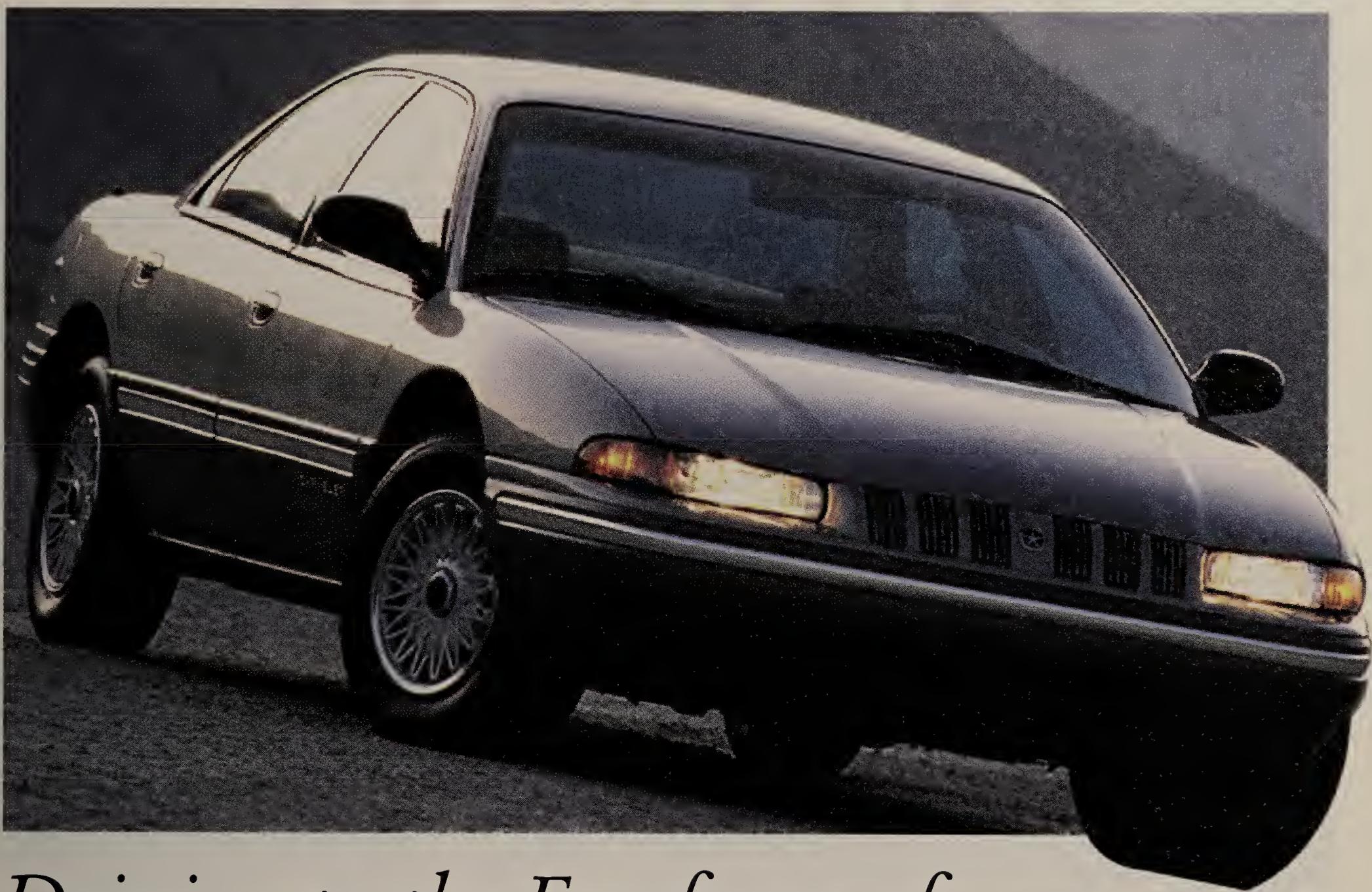
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LAN INTERNETWORKING



Driving to the Forefront of Technology. Advantage: Chrysler.

Challenge

To design and build an enterprise network which supports interoperability between legacy systems and applications, as well as new and future applications. The network must integrate the diverse departments involved in the development of new vehicles, including Product Design, Engineering, Manufacturing, Procurement and Supply, Finance, Sales and Marketing.

Solution

Ascom Timeplex designed an integrated standards-based router network using Ascom Timeplex TIME/LAN FDDI Backbone Routers to form the core of the network at Chrysler's new Technology Center (CTC). This network allows the CTC to implement network changes faster and at lower cost. **Most important, the Ascom Timeplex network helped Chrysler reduce the time it takes to bring a car to market.**

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INTEROP:

Cultivating the leading edge



President Daniel Lynch details future of INTEROP, highlights of this year's show.

WILL TERRY

nterop Co. President Daniel Lynch practices what he preaches.

This interview with Lynch, conducted by Joanne Cummings for *Network World*, was done over the Internet.

Between flights to Japan and preparations for next month's INTEROP show, Lynch detailed the highlights of the show as well as his plans for the future of INTEROP.

What are your goals in relation to the upcoming show and the future of INTEROP?

I want our attendees to get as much as they possibly can from INTEROP 93 August. Nowhere else can

you get an education from the people who invented the technology.

I am pleased to say that there is going to be a lot of excitement and activity. [Asynchronous Transfer Mode] will show progress, middleware is going to emerge, there will be new applications on the net, and exhibitors are planning lots of announcements.

Looking ahead, we intend to maintain the high quality and technical excellence that INTEROP has built its reputation on. NetWorld + INTEROP 94 will address both the traditional NetWorld and INTEROP audiences, mirroring the market's convergence of the LAN, WAN and telecommunications technologies.

Specifically, we'll be expanding our conferences and tutorials to more fully address desktop and client/server issues. In addition, the INTEROPnet will include even more technologies and products,

the Solutions Showcase demonstrations will be reintroduced, and our base of exhibitors will be expanded.

In short, we're going to offer quality and content that people won't be able to find elsewhere.

What will be unique about INTEROP 93? What are some of the products and technologies that attendees should be keeping an eye out for?

Video and audio, intelligent networking hardware, further discussion about the next generation of IP, IBM's peer-to-peer networking, SNMPv2, more on ATM and high-speed networking.

We're also increasing our emphasis on mechanisms for developing distributed applications, and there will be more visibility for the Internet, to

(continued on page S46)

LAN INTERNETWORKING



Worldwide Lotteries & Scientific Games: A Winning Combination.

Challenge

To design and build a network for Scientific Games Inc. (SGI), a leading supplier of instant lottery tickets and lottery data processing systems and services to 60 lotteries around the world. The network must support SGI's worldwide customer base, yet be flexible enough to be sold as part of a stand-alone system. In addition, it must provide constant support for a mixture of real-time lottery transactions, local area network traffic and terminal data entry.



Solution

Ascom Timeplex designed and installed a network comprised of TIME/LAN Routers, to provide a new flexible network architecture for Scientific Games. Originally designed to support only TCP/IP, the network has become the backbone for communications at SGI by providing support for existing X.25 networks and new frame relay-based services. An innovative service agreement covers not only the routers, but also includes other equipment at customer sites, providing Scientific Games with the comfort of knowing their network is supported by a qualified service team 24 hours-a-day, 7 days-a-week.

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Cultivating the leading edge

continued from page S44

name a few. Plenary addresses on interactive television, distributed object technology and something called the Laws of Telecosm are scheduled.

Could you give us an idea of why these subjects were chosen and how they may be important to network managers?

This August, the three plenaries provide a look ahead to some of the midterm technology challenges and opportunities for networking and distributed computing. The plenary speakers have a coherent vision of the applicability of their areas to the networking and computing marketplace.

Why are these topics at INTEROP? Because each will fundamentally affect the jobs of the network manager and professional during the next few years.

For example, interactive TV may be one of the most comprehensive networking challenges ever undertaken. Decoding the bits at the user end is really the least of the challenges; the infrastructure required in terms of network services will be phenomenal. The interoperability challenges raised by the scurry to seize market share could be daunting.

[Hewlett-Packard Co.] got into this market before the craze hit. HP is a proven leader in many technology areas, and managers should listen with interest to what Bob Frankenburg [vice president and general manager of HP's Personal Information Products Group] has to say.

George Gilder [senior fellow at the Discovery Institute and technology writer] did a superb job in analyzing the dynamics of the microprocessor revolution, which has brought us to where we are today.

He is now turning his attention to the technology phenomenon of the '90s: pervasive networking. As microprocessors were to the '80s, so will networking be to the '90s. George provides a clear, high-level picture of where this is taking us.

Finally, there is a natural synergy between object orientation and networking; the complexity inherent in a distributed multiplatform environment mandates a software technology that buffers users and developers from the underpinnings. Object orientation provides just that.

You'll notice that all of the major systems vendors are incorporating object-oriented systems and software into their strategic product plans. IBM has stated, for example, that object orientation is the only mechanism through which we'll ever see pervasive distributed computing.

Adele Goldberg [chairman of ParcPlace Systems, Inc.] is one of the pioneers of object-oriented technology and will provide a clear perspective of the effect of this exciting networking technology.

What are turning into the hottest sessions this year? Are they different from last year's?

As we saw last year, there will be great interest in the ATM-related sessions, especially those that deal with ATM as a LAN architecture. Other traditional INTEROP hits, such as high-performance routing, should continue to draw crowds.

We're putting more emphasis on advanced applications and services — including developing those applications — and I expect that those sessions will draw very well. Sessions such as audio and video on the Internet should be extremely popular, for example.

What is this year's planned debate?

The planned debate is a continuation of an INTEROP near-tradition of posing some element of [Open Systems Interconnection] against the corresponding element of TCP/IP. In this debate, two of the industry's wittier and more caustic technologists — Marshall Rose [author and principal of Dover Beach Consulting, Inc.] and Paul Mockapetris [principal investigator at the Defense Advanced Research Projects Agency] — will square off on the relative merits of [Domain Name System] and X.500.



Daniel Lynch

In keeping with a more traditional debate format, a toss of the coin will decide who argues for which position. Each is well qualified and experienced with both technologies — the evening should be as entertaining as it is educational.

I understand there won't be any showcases this year. Why is that, and is there something taking their place?

We are in the process of revamping our Solutions Showcase program to better meet the needs of our customers and the marketplace.

Exhibitors who wish to demonstrate multivendor interoperability will be doing so within their booths and over the INTEROPnet. There will be multivendor demonstrations for both ATM and [Advanced Program-to-Program/Advanced Peer-to-Peer Networking].

How many vendors will be participating in the INTEROPnet, and what types of technologies will be used? How can attendees interact with the net?

The INTEROPnet will connect over 400 exhibitors. It includes 80 miles of cabling and encompasses six different protocols: TCP/IP, IPX, SNA, OSI, DECnet and AppleTalk — over Ethernet, token ring and FDDI.

Applications running over the INTEROPnet will include Lotus Notes, Novell [Inc.] MHS, Clarinet, [Wide Area Information Servers]/Gopher, Microsoft [Corp.] SNA Server and WordPerfect [Corp.] Office.

Attendees are encouraged to ask exhibitors how they have connected to the INTEROPnet and how they are using it. Attendees can also gain access to the Internet by using the show network's terminal clusters. □▽○

LAN INTERNETWORKING



Ferris State University: Teaching & Technology for the Future.

Challenge

To design a network that provides high-speed connectivity for Ferris State University's 12,000 students and over 2,000 workstations. The network must support many protocols, including IPX/SPX, TCP/IP, SNA and AppleTalk to connect 23 academic and administrative buildings on the University's main campus, as well as to provide wide area connectivity to other institutions. In addition, the network must allow staff and students to access all data facilities including mainframes, library, Novell, Internet and Client/Server based services from any workstation at any time.

Solution

Ascom Timeplex developed a strategic network plan, which included TIME/LAN multiprotocol routers utilizing an FDDI backbone with Token Ring, Ethernet and wide area networking connectivity to neighboring networks. This solution provided a solid foundation for the future of the campus network, with an unlimited amount of growth capability. Most important, the network helped improve the quality of student life including the ability for students to go to any computing laboratory, and obtain the proper information for their field of study.

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Researching for the future

BY DAVID COLEMAN

Groupware and work group computing burst onto the information technology scene with the coming of the 1990s and the laying of cable for a network infrastructure. But groupware didn't really burst into the public eye. Groupware and most other technologies are reported on by research institutions years before these technologies ever become commercialized.

This article is a look today at what tomorrow's groupware products and functions may be. By interviewing researchers at leading institutions working on groupware projects, Network World hopes to give you a glimpse of the role groupware may play in your future.

We talked with Marvin Manheim, William A. Patterson distinguished professor at the J.L. Kellogg Graduate School of Management at Northwestern University. Manheim is also chairing the strategic executive conference at GroupWare '93 and is conducting a variety of research projects focused on the strategic aspects of groupware on a global basis.

What research projects are you currently working on that deal with groupware?

The major project we are working on is how companies use groupware to gain a competitive advantage. This is part of an overall project on globalization of competition and its implications for business strategy. We study how companies change what they do and how they do it to deal with new forms of competition, such as offshore companies entering domestic markets, or how the newly forming European community creates issues and opportunities.

We examine how companies are restructuring their sales cycles as well as streamlining distribution and manufacturing. We do this by looking at the critical business processes and the role [in-

formation technology] plays in improving the processes. For example, how do you do global account management? How do you coordinate sales and marketing efforts in several countries for a single account?

Obviously, coordination and collaboration are critical in keeping such a global customer happy and the company profitable. How would such a team work together?

For a global account, a team-selling process is required. This is just as true for the seller as the purchaser. Teams involved in this process are often cross-functional and cross-geographical, and can even involve strategic partners. The selling process is multiphase and involves building relationships as well as consultative problem solving. Groupware is very effective in this context.

What groupware products have you examined for these multinational teams?

We have looked at Lotus [Development Corp.'s] Notes, Ventana [Corp.'s] GroupSystems V and Collaborative Technologies Corp.'s VisionQuest. However, we have a strong view that a groupware technology is only one component of the overall architecture for an effective task team support system.

When building such a system, we ask, 'What is the central task, and given my strategic objectives, how do I design a system for this team and this task?' Any groupware product must fit into an overall [information technology] strategy, so an important feature is the degree to which the groupware links to legacy software, other PC software or server-based applications.

This looks like a big project. Can you break it down into components?

One aspect is to look at team-based decision support systems for production and logistics. Myself and Nicholas Vlahos, research assistant professor at Northwestern University, are exploring this for transportation companies like British Airways [PLC]. We are also examining the processes of implementation of team support.

What about your work with Lotus Notes?

We are using Notes to design a "meta-groupware" application, that is an application to be used by a team that is planning or implementing groupware applications. This project is based on research that says planning and implementing groupware is a business change process and, therefore, has to be managed as a process change activity rather than just a software development activity.

How have you used Ventana's GroupSystems V?

We used it for IBM. We developed a three-day executive workshop on cus-

I understand you are working with a group of large European companies focusing on the strategic aspects of groupware. How did this come about and can you tell us more about this high-level user group?

Last May, IBM Europe invited me to talk at their customer forum in Vienna, Austria, about teamware as a competitive weapon. There were a thousand attendees, and out of that, a group of Europe-based companies has arisen called The Black Forest Group. This group meets quarterly to share experiences and perspectives on groupware and work flow tools as well as their business implementation.

A second institution that has long been known for technological research and innovation is the Massachusetts Institute of Technology. We spoke with Bob Halperin, executive director of the Center for Coordination Sciences at MIT's Sloan School of Business. The center has 25 employees, 23 of which are doing research. The center enjoys a unique relationship with the industry and invites sponsoring companies to send researchers to collaborate with their faculty.

What trends do you see in groupware?

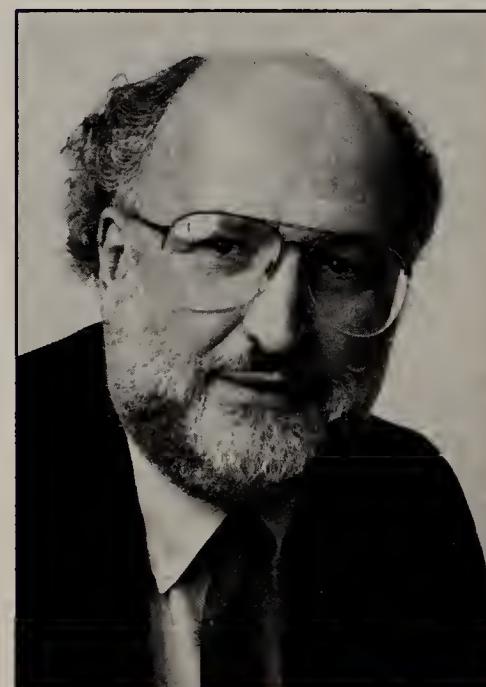
We see a number of trends. First, groupware capabilities will be rolled into everyday software like word processing and spreadsheets. Second, we will see more tailorable tools that can be modified by end users to support new work flows and processes.

The idea is that organizations are changing rapidly and their MIS systems need to keep pace. To do that, the changes must be closer to the customer.

Therefore, development must rely less on the intuitive sense of how the group works and be more closely guided by coherent theories of how people coordinate their activities and how they might do it differently with computer support.

So for us at MIT, the study of coordination is a core concept.

(continued on page S50)



Marvin Manheim

tomer satisfaction. The executives attending this workshop market IBM products to transportation and logistics companies and a few other industry sectors. The workshop used lectures, discussions, small group discussions and TeamFocus [IBM's version of GroupSystems V] for structured interactions in some sessions.

For example, after a presentation on the aspects of customer service, the executives used TeamFocus to brainstorm ideas critical to their particular business sectors. In this case, groupware supports the overall task of a strategy process.

LAN INTERNETWORKING



D'Arcy Masius Benton & Bowles: Networking Around the World.

Challenge

To design and build an integrated network for D'Arcy Masius Benton & Bowles (DMB&B), a leading worldwide advertising and marketing company, that combines IPX, IP and SNA traffic. The network also must support traffic from eight remote sites across the United States, allowing DMB&B to track customer and market trends.

Solution

Ascom Timeplex designed, built and installed a network using TIME/LAN Routers located in New York, Connecticut, Illinois and Michigan. The network carries client information, as well as SNA traffic from IBM AS/400 midrange computers to fileservers via Ethernet and Token Ring networks. The network allows DMB&B to connect work groups across the United States, improving information processing so that DMB&B can better focus ads at target markets in the print, radio and television media.

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(continued from page S48)

Why study something as abstract as coordination?

To understand coordination better has a lot of practical payoffs; it gives companies that are developing groupware products new knowledge with which to design their products. However, in the long term, understanding coordination will help companies organize themselves more effectively.

For example, Wanda Orlikowski is looking at using Lotus Notes at a large consulting organization. The results of that study suggest there are a number of important

organizational elements, such as the organizational reward systems or work place norms, necessary to support the successful use of groupware.

Constance Perrin, a consultant for the Groupware Studies Project, at the MIT Center for Coordination Science, is studying the deployment of an electronic conferencing system at a large European company. The goal of this study is to look more closely at the organization and see how it affects how well the groupware is adopted and used. It is important to look across cultures and across countries.

Another project looking at communications styles is examining E-mail in the U.S., and to see how Japanese electronic bulletin board use differs from U.S. norms.

You said coordination was a core research area for MIT. Who is working on coordination theory or coordination technology?

Coordination technology is our second area of research. This is designing and studying innovative computer systems that help people work together either in large or small groups.

In traditional groupware research, the most important technology we have is the Objects, Views, Agents, Links project. OVAL is a prototype system that is a radically tailorable environment that supports group work. The system integrates important features of object-oriented databases, hypertext, E-mail and rules-based agents.

It has great bearing on commercial applications. An earlier version of OVAL was called the Information LENS. The rules-based agents that were developed from this research were eventually licensed from MIT by Beyond, Inc. for their rules-based mail technology.

What are the group or team advantages of combining these technologies?

OVAL combines many different applications into a single integrated environment with a simple and consistent [graphical user interface] for everything from reading mail to database queries. All OVAL applications can interact with one another.

OVAL also gives end users the power to create and modify their applications without MIS' help. We tested the applicability of OVAL by using it to replicate the function of other groupware tools, such as Lotus Notes or gIBIS [developed at Micro-Electronics Consortium and now marketed by Corporate Memory Systems, Inc].

A later interesting test was to use OVAL in a real business situation to model business processes with OVAL. We went into a large consumer products company and looked at their marketing organization. We saw what data [hard and soft information] was coming into the group. That data is absorbed, understood and analyzed.

From that analysis, issues are identified and plans made and implemented to respond to the identified issues. What was found was that OVAL [which is not a commercial product] could be tailored by a business student to support this environment.

I understand your third area of research is headed by Tom Malone.

Yes, this is Malone's principal interest: coordination theory, developing and testing theories about how coordination can occur in many systems, such as human organizations, markets and computer nets. A major focus of this research is a project called the Process Handbook Project. The goal of that project is to help organizations redesign their existing processes and "invent" new processes that take advantage of [information technology].

They are collecting, organizing and analyzing lots of examples of how different companies perform similar functions or by developing new methods to represent and codify these processes. The motivating goal is that these process descriptions will be stored in an on-line electronic "process handbook," which companies can consult to find a variety of ways to perform particular activities, along with experiences and guidelines on which alternatives work best in which situations. □▽○

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Coleman is a senior partner at Soft-Mark Services, a San Francisco-area marketing and consulting firm. He is editor of the "GroupTalk" newsletter and can be reached at (415) 282-9166.

LAN INTERNETWORKING



U.S. Military Academy: Helping cadets be all that they can be.

Challenge

To provide a high performance backbone network for the United States Military Academy to expand capacity for over 6,000 personal computers and workstations which are used daily by cadets, professors, and administrative personnel and allow the migration to new high-bandwidth scientific applications. Network security and reliable traffic performance were critical requirements driving the migration from Ethernet to FDDI.

Solution

Timeplex Federal Systems customized and installed an FDDI backbone network consisting of TIME/LAN FDDI Routers. The TIME/LAN network improved throughput performance by a factor of 20 and greatly enhanced security. The network has the capability to migrate new applications as they are implemented and provides the 4,000 cadets at the United States Military Academy the network power to work effectively with their professors, cadets, and other school services, including the library.

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TIMEPLEX FEDERAL SYSTEMS, INC.

Easing communications

By Dave Burns
Special to Network World

After Cravens, Dargan & Co., a Houston-based commercial insurance wholesaler, decided to downsize its operating environment from a mainframe to networked PCs, it also took the opportunity to improve the operation of its inter-company communications.

"As an insurance wholesaler for com-

mercial agents, rapid communications is a strong competitive advantage," says Ken Davis, senior vice president at the company. "We had one major communications goal in mind when we moved from the mainframe to the networked system" to get rid of the phone memo pink slips that were flying around the office, often getting lost under piles of other papers and requiring time that we couldn't afford to move

[them] throughout the office. "We actually had a second receptionist whose primary responsibility was to disseminate the messages that were piling up."

Davis points out that in his firm's office of 75 employees, communications occurred at multiple levels. First, it had staff located on different floors who needed to be able to communicate quickly. Even more importantly, the company received calls all day from independent agents across the country who needed quotes quickly for insurance coverage.

As the company downsized in early

1992 to a single-server Novell, Inc. environment, Davis undertook a project to evaluate alternative electronic mail products. He began by examining the industry literature and discussing the firm's needs with other E-mail users.

One company that had a big influence on Davis was Mountain States Software, Inc., supplier of his insurance software. Representatives from the company suggested Team from Futurus Corp., an Atlanta-based developer and marketer of E-mail software for personal computers.

Davis' analysis lasted about one month, at which time he decided on Team. The local Futurus representative installed a test setup for 25 of Cravens, Dargan's customer service representatives, and the users fell in love with Team almost immediately.

"It has allowed us to speed up communications and stop telephone tag," he says. "Now when we get an urgent call for someone who's already on the telephone, we have several options. Rather than taking a paper message, the receptionist can use the chat capabilities of Team to send a



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USER : Cravens, Dargan & Company
PRODUCT : Team from Futurus
OBJECTIVE : To improve the operation of intercompany communications

- Speeds up communications and stops 'telephone tag'.
- Representatives can keep a historical track of their phone calls to maintain better account control.
- Senders of messages can request an automatic acknowledgement to verify that a message has been read.

message to the representative that appears immediately on the computer screen with an audible beep. The representative gets the word about the call while the caller is still on hold and can handle it in a timely manner."

Representatives can now keep historical track of their phone calls to maintain better account control. Senders of messages can obtain automatic acknowledgments verifying that the message has been read.

Even large documents that would typically have to be copied and distributed can now be attached to messages and distributed electronically.

"The paper flow within the company has been reduced dramatically as electronic messages fly across the system," he says.

Davis is most surprised by the degree to which Team has helped increase the efficiency of communications at Cravens, Dargan. "Futurus' Team has been one of the most [effective] enhancements to our automation process and has done more to bridge the gap of automation than any other single product that we've brought in," he adds. □▽○

Burns is a senior partner at SoftMark Services, a San Francisco-area marketing and consulting firm. He can be reached at (415) 282-9166.

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2 Request for proposal
3 Request for information

2. Purchase timeframe

4 Within 60 days 6 Within one year
5 Within six months

3. Scope of purchase responsibility

7 Enterprise wide 8 Departmental

4. Purchase influence/number of sites

9 one site 11 10-20 sites
10 2-9 sites 12 21+ sites

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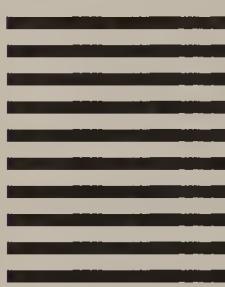
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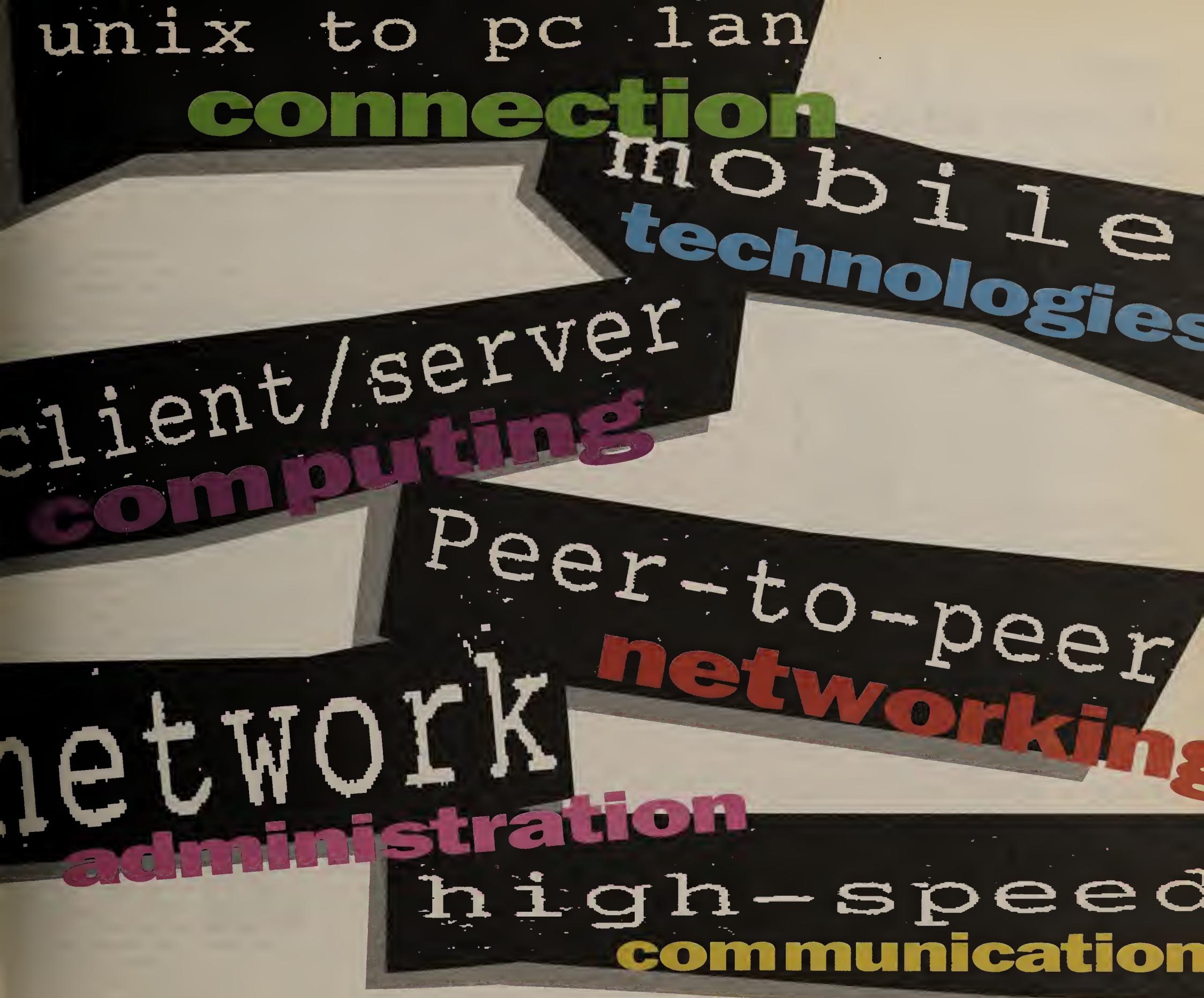


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API to give mobile devices access to positioning service

BY ELLEN MESSMER

Washington, D.C.

Four vendors in the fledgling pen-based computer industry are backing an open application program interface (API) to give mobile devices access to the government's free satellite service for global positioning.

AT&T, GO Corp., PenStuff, Inc. and Trimble Navigation, Ltd. will incorporate the Global Positioning System (GPS) API in personal communicator software to be released this fall.

Through the use of a common software API, hand-held devices will be able to access the government's geopositioning services in a uniform manner.

The government's \$13 billion satellite system, the Global Positioning System, continually transmits latitude, longitude and time information on a particular location back to earth. Developed for military purposes, the system blankets the earth, providing satellite information that is also used by surveyors for precise land measurement.

But the GPS API, jointly developed by Rochester, N.Y., software firm PenStuff and Trimble Navigation,



cox

a Sunnyvale, Calif., manufacturer of positioning products, is the industry's first step in creating a de facto communications standard to give mobile devices access to the satellite service.

The goal, said Steve Cox, senior marketing manager at the AT&T Microelectronics division, which makes the Hobbit microprocessor for mobile computers, is to foster interoperability in hardware.

For instance, Trimble's GPS Personal Computer Memory Card International Association (PCMCIA) card with miniature antenna — the Trimble Navigation Mobile PCMCIA Sensor — will work with any device using software that supports the GPS API.

The government-funded geopositioning information could be useful in many businesses, including the trucking industry, as well as taxi and fleet services.

GPS devices outfitted with digital cameras could also prove useful to insurance agents assessing damage after weather-related disasters.

The GPS API will be published on GO's electronic bulletin board on CompuServ this summer so that third-party developers can design GPS applications for the company's PenPoint operating system. In addition, PenStuff will offer a software developers' kit for GPS this summer, said Scott Pomerantz, chief financial officer at the company.

"This API expands the usefulness of the AT&T EO Personal Communicator to solve a whole new class of problems for customers," said Alain Rossman, president and chief executive officer of EO, Inc., a company in which AT&T holds a majority share. The EO pen-point device, based on GO's PenPoint operating system, uses cellular frequencies to transmit data. □

Nynex

Continued from page 26

Customers would receive 50% to 60% off regular monthly fees depending on such details as network configuration and how often the line is to be tested. The reduced rates could mean paying \$300 to \$350 per month for a standby T-1 line vs. paying \$600 for a full-time T-1. The carrier is also offering bulk rates for such services as call forwarding.

"It really does give the customer an option now, and he has to think about whether he really needs a [competitive access provider]," Rohan said.

But Teleport contends that many users will still choose to have a second network service supplier rather than using the Crisis Management Service. If a large portion of New York Telephone's network went out, a standby line might go down, as well, points out Robert Atkinson, Teleport's senior vice president of regulatory and external affairs.

In contrast to New York Telephone's standby services, Pacific Bell is sticking with its seven emergency

response centers to help customers restore nets by requesting circuits as needed. At the centers, Pacific Bell personnel assess damage caused by disasters, develop restoration plans and prioritize net repairs.

Pacific Bell can usually restore service within 24 hours. But without backup networks in place, the carrier cannot guarantee that lines will be available. However, the expense of the backup networks has deterred many users from provisioning them, according to Gail Hutchens, a business contingency planning manager with Pacific Bell.

"Most customers can't cost-justify it," Hutchens said. "Even the most sophisticated company that's got money to burn would not think that's a very prudent way to handle their business."

Pacific Bell has set up a disaster preparedness team. The Contingency 1 Preparedness Solutions program draws upon the company's net design specialists for business contingency planning for nets.

Once a plan is on file with Pacific Bell, a user can be assured of being on the carrier's service restoration list in the event a regional disaster wipes out service in a wide area. □

BRIEFS

Continued from page 26

MCI Communications Corp. has announced that Kmart Corp. signed a multiyear, multimillion dollar contract for 800 services. Kmart had used AT&T and MCI 800 service in tandem to get a clear picture of each carrier's performance, service and features. "We looked at each carrier's ability to offer us different types of 800 service, such as international, then we looked for the features we wanted," said Ray Dennis, telecommunications manager for Kmart in Troy, Mich. "They were equal so it boiled down to pricing."

Separately, MCI announced it has won 800 business from Lens Express, a Deerfield Beach, Fla.-based mail order contact lens firm. In the past, Lens Express split roughly \$1 million a year on 800 service between AT&T and MCI. The company handles about 500,000 customer calls a month.

Polish Telecom has inaugurated a satellite earth station at Psary, just south of Warsaw, which will support fully digital communications with Europe via the European Telecommunications Satellite Organization (EUTELSAT) satellite network. The station, built by Long Island-based Satellite Transmission Systems, was funded by a loan granted to the Polish government by the World Bank.

California

Continued from page 26

up. How much and how soon will depend on which plan is adopted.

The judges are for a smaller and more gradual increase in private-line charges, while Shumway believes rates should be raised more quickly and to a higher level. Pacific Bell estimates private lines would have to be increased an estimated 50% or more to recover costs for the service. Private-line business rates, along with basic monthly business rates, have long been subsidized by intra-LATA toll charges.

The commission will be receiving written comments prior to a hearing in Los Angeles Aug. 30. Interested parties have until Aug. 2 to comment on the commissioner's ideas and Aug. 10 to comment on the judges' proposal. A

final commission vote on the judges' proposal will be on Sept. 17, when the commissioners can either vote to accept it, modify it or adopt an alternate plan.

Such plans are generally supported by local operating companies, with the caveat that they be given greater pricing flexibility to compete effectively.

GTE California and Pacific Bell, the state's two largest telephone companies, are still studying the lengthy proposal, but have expressed enthusiasm for comments by Commissioner Shumway in favor of pricing flexibility.

"The commissioner has taken a bolder step than the judges," said Mike Miller, Pac Bell's vice president of competitive readiness. "The judges have had the traditional regulatory approach. The commissioner has said, 'Look, there's no way you can hold back competition. The market's changing; let's get on with it.' " □

MCI

Continued from page 26

work becomes an information utility that has resident within it different information databases for transactions, for processing, for information direction," Weichselbaum said. "That's the kind of business that we're interested in."

MCI's future lies in providing such value-added services, Weichselbaum said. Once a service is mature, it quickly becomes a bulk commodity, bringing in new competitors and driving prices down, he said. That pattern may account for Weichselbaum's lack of enthusiasm for MCI's acquisition of BT North America's X.25 packet data network, Tymnet.

That X.25 service is only worth "a few hundred million" in annual revenue, according to Weichselbaum. MCI is more interested in bringing on board experienced BT North America sales, support and operations staff for virtual data network services, he said. BT and MCI are still working out the details of the merger and do not expect to be finished before next year. In particular, MCI has not yet decided whether it will unload its share of Infonet, a BT North America competitor in X.25 packet data service, he said.

"We've got our technical folks meeting with theirs; we've got our product marketing people meeting with theirs," Weichselbaum said. The staffs are "rationalizing two different platforms, the technologies, how they can be interleaved and how they ought to migrate the services that would lay on top of them," he said.

Once the networks are sorted out, BT North America's X.25 packet data services should help position MCI to compete with AT&T in the virtual services market. MCI has been forced to concede the lion's share of the private-line market to AT&T, where the behemoth still holds 70% to 80% of the market, Weichselbaum estimated. MCI is hoping it can do better in the emerging

virtual services market where AT&T is not yet dominant.

MCI is counting on the Bell operating companies' Integrated Services Digital Network plans to help the virtual services market along. Currently, only 30% to 40% of all telecommunications users can be reached via switched digital lines. For ISDN Basic Rate Interface (BRI), the penetration rate is even lower, but aggressive ISDN deployment by some of the BOCs will mean wider switched 56K bit/sec access over BRI's two 64K bit/sec bearer channels.

Such wider connectivity could also encourage the MCI frame relay customers that are still only testing the service with small networks of three to four nodes to further develop their networks. Only a small number of early adopters have built extensive frame relay networks, Weichselbaum said.

MCI introduced the service a little more than a year ago, but it did poorly until February, when remodeling increased its performance, cut costs and set a network migration path beyond frame relay.

SMDS' FUTURE

MCI is not as close to success with SMDS. It had planned to have the service available this summer but postponed the launch until January 1994 for lack of operational support, Weichselbaum said. Earlier, the carrier had cited delays in suppliers' equipment deliveries to explain the holdup. However, he said the carrier is dedicated to offering the service, which the Consultative Committee on International Telephony and Telegraphy has chosen as the standard connectionless, variable bit-rate service for ATM networks.

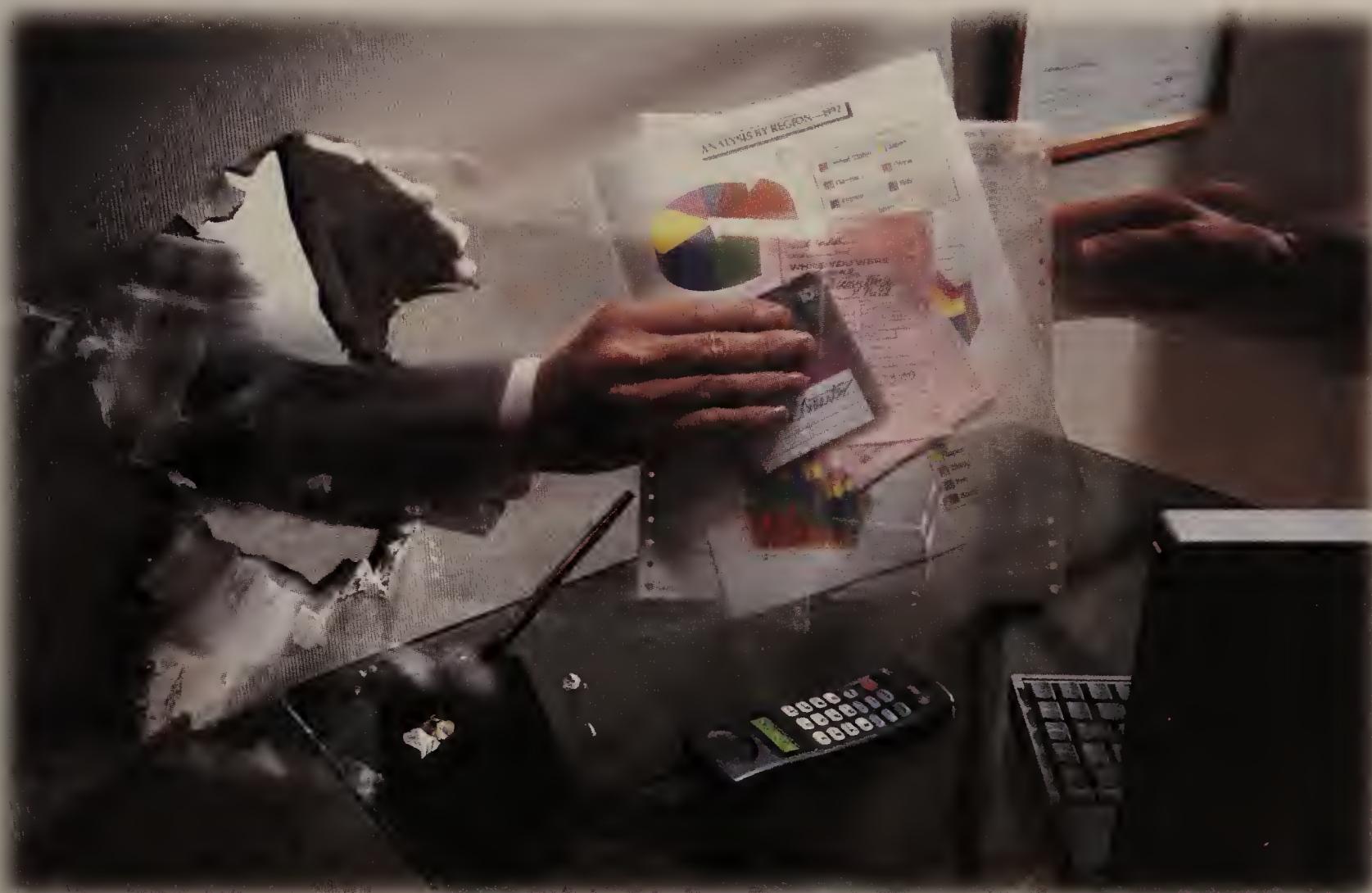
MCI's overall intention for ATM service offerings remains hazy, other than general plans to offer such standard services as frame relay over its ATM network.

Weichselbaum said the company is waiting for a better definition of ATM but expects the technology will eventually be used to support its packet services. □



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Windows version of Notes taps key niche

BY WAYNE ECKERSON

Framingham, Mass.

One of the surprise features in Lotus Development Corp.'s Notes Version 3.0 announced this spring was a Notes server that runs on Windows 3.1 workstations.

So far, user reaction to the Windows Notes server has been positive and in line with Lotus' purpose in offering a scaled-down platform for running Notes applications. That purpose was to provide a low-cost way for users to implement Notes, according to Ray Ozzi, president of Iris Associates, Inc. Iris developed the core Notes technology for Lotus.

"The Windows server version of Notes has given us a cheap way to experiment with Notes and determine if we want to deploy Notes on a larger

Noticing Notes

According to Lotus Development Corp., more than 1,500 organizations are using Lotus Notes worldwide and Lotus sold more than 75,000 Notes licenses in last-quarter 1992.

Windows or OS/2 Notes server and two Windows clients for \$995.

"When you have to spend \$20,000 to bring up a product, you think twice about it," said Jim Shelton, director of *See Notes, page 87*

scale," said Matt Merrick, manager of information systems at The Merrick Printing Company, Inc. of Louisville, Ky.

Some users are deploying the Windows server to support production applications that run on laptop computers, while others are using it as an inexpensive method of developing and prototyping Notes before deploying it throughout the enterprise. Most users have purchased the Windows Notes server as part of Lotus' Starter Pack option, which contains a

NetWare Global MHS users share their experiences

Users sold on the product's cost and integration with NetWare.

BY BOB BROWN

Beta users of Novell, Inc.'s NetWare Global Message Handling Service (MHS) offering are giving the multiprotocol electronic mail server software good reviews based on its cost, flexibility and tight integration with NetWare.

NetWare Global MHS is an enterprise messaging integration platform based on a series of NetWare Loadable Modules (NLM) that enables users to house messaging, file and other types of servers on the same system. The product made its debut last summer, and Version 2.0 began shipping earlier this year.

The state of Idaho recently completed a 400-user pilot test of what could turn out to be one of the biggest NetWare Global MHS implementations. The state chose the product as the basis for a statewide store-and-forward messaging service to be offered to agencies across Idaho, said Jake Hoffman, technology coordinator for the state.

The decision to go with NetWare Global MHS was based largely on the state's heavy use of NetWare, he said. The product also features Simple Mail Transfer Protocol (SMTP) and IBM Systems Network Architecture Distribution Services modules, which the state needs to provide connectivity between its MHS-based mail systems and those based on Digital Equipment Corp. VAXes and IBM mainframes.

Novell has also announced an alliance with Retix to develop an X.400 module for NetWare Global MHS, which is in line with Idaho's plan to migrate to X.400, Hoffman said.

Overall, Hoffman was pleased with the perfor-

mance of NetWare Global MHS during the pilot, as well as the price — less than \$1,000 for a 100-user NLM. NetWare Global MHS won out over offerings from companies such as Hewlett-Packard Co. and Soft-Switch, Inc. largely due to price, Hoffman said.

Facts about NetWare Global Message Handling Service 2.0

Product description

A scalable messaging server designed for NetWare environments and based on a set of NetWare Loadable Modules (NLM)

Messaging protocol NLMs

Systems Network Architecture Distribution Services, Simple Mail Transfer Protocol and X.400

Software requirement

NetWare 3.11 or higher

Hardware requirement

Intel Corp. 80386- or 80486-based server

Price

\$495 for 20 mailboxes to \$7,495 for 1,000 mailboxes

Availability

Began shipping in January through Novell resellers

NOVELL

GRAPHIC BY SUSAN J. CHAMPEY

SOURCE: NOVELL, INC., PROVO, UTAH

However, Hoffman warned potential NetWare Global MHS users that they may run into problems setting up messaging directories if they have not been careful in the past about giving NetWare servers unique names. Idaho typically had unique server names within each agency, but as Hoffman linked

See Global MHS, page 88

BRIEFS

NCR Corp. has teamed with **AT&T EasyLink Services** and **Delrina Corp.** to offer a turnkey electronic forms routing package called NCR Liberty. The package will enable users to send electronic forms across local- and wide-area nets without having to buy additional electronic mail software. NCR Liberty features two modules — Liberty Designer/Filler for developing forms-based applications and Liberty Filler for filling out and routing forms electronically. Liberty Designer/Filler will be available in August for \$1,000, while Liberty Filler, also available in August, will cost \$199 per user.

NCR: (513) 439-8404.

Data General Corp. last week announced that it will resell **Uniplex, Ltd.**'s onGo Office and onGo Write/Paint/Draw groupware software products on the DG AViON server platform. DG will sell the products as AV onGO Office (\$262 per seat for 100 users) and AV onGo Write/Paint/Draw (\$298 per seat for 100 users).

The **Electronic Mail Association's (EMA)** Private Management Domain Operations Committee has released a new white paper, "Externally Defined Body Parts (Body Part 15)." The paper addresses issues associated with automated identification of and interoperability between application data types in electronic messages. The paper has been written for both users operating private electronic mail nets and vendors of applications and messaging systems. The paper costs \$35 for EMA members and \$80 for non-members.

EMA: (703) 875-8620.

Kaleida Labs, Inc., the Apple Computer, Inc. and IBM joint multimedia venture, has named IBM veteran Michael Braun to replace Nat Goldhaber as its president and chief executive officer. Goldhaber has been named a cochairman of the Mountain View, Calif., company, whose mission is to develop cross-platform multimedia technology, such as its ScriptX scripting language.

Braun most recently was vice president and managing partner of IBM's *See Briefs, page 88*

Farallon gives Adobe Acrobat run for money

BY WAYNE ECKERSON

Alameda, Calif.

Farallon Computing, Inc. has announced software that lets personal computer users exchange documents across different platforms and applications without losing original formatting, fonts or graphics.

Called Replica, the software is designed to work with Windows or Macintosh computers and can be integrated with local-area network electronic mail systems, such as Lotus Development Corp.'s cc:Mail.

"As a network vendor, we've enabled users to share files between Windows and Macintosh computers," said Bill Freedman, product marketing manager at Farallon, which is based here. "With Replica, we can now let users share files that can be read in their origi-

nal format."

Freedman said cross-platform document viewing software enables users to share documents without buying compatible software for every desktop in the organization.

Replica is akin to Adobe Systems, Inc.'s Acrobat software, which was recently introduced with a lot of fanfare. Freedman said Replica offers many of the same capabilities as Acrobat but is half the price and can run on smaller machines.

Replica consists of Replica Creator and Replica Viewer software. The Creator software works with any Windows or Macintosh application that can produce printed output. It converts documents into a special Replica format, which can be read from within any application that supports the Replica

Viewer.

The Viewer, which runs on 80286-based or higher PCs, allows users to view Replica documents from within any Windows or Macintosh System 7 application. The Viewer lets users copy and paste any part of a Replica document, including text and graphics, into other applications or documents.

Users can also include a runtime version of the Viewer in a Replica file they want to distribute, thereby enabling recipients to view the file without having the Replica Viewer loaded on their machines. Recipients of such documents can load the Viewer onto their hard disks at no charge, Farallon officials said.

Farallon recommends that users run Replica on 386 PCs with 4M bytes of memory.

Replica is priced at \$99 per copy and \$749 for a 10-user version. Replica for Windows is currently available, and the Macintosh version will be available by the end of the year.

©Farallon: (510) 814-5100.

Sybase to unveil new object-based tools

BY DAVID KELLAR

Tokyo

Sybase, Inc. is readying an object-oriented application development tool that will enable developers to easily create graphical user interface-based applications for distributed client/server systems.

The tool, to be announced Aug. 30 in the U.S., is intended for use in creating graphical front-end applications that are easier to use than character-based applications but do not require the comprehensive multimedia capabilities provided by more complicated tools, said Malcolm Colton, Sybase's director of product management.

Designed to be the mainstream application development environment for Sybase enterprise client/server systems, the tool offers high productivity for application developers and end users, according to Colton.

Although reluctant to provide details on the tool, Colton said it will be object-oriented and based on a fourth-generation language.

It is intended to fill the gap between APT, Sybase's low-end character-based development tool, and Gain-Momentum 2.0, the firm's recently announced high-end multimedia development tool.

DME CONNECTION

Colton also disclosed the company's plans to bolster its system management products with a new suite of integrated tools based on the Open Software Foun-

dation, Inc.'s Distributed Management Environment.

"Of the four areas that make up our product line — database, connectivity, [application development] tools and system management — system management is the least mature," Colton admitted.

To strengthen this area, Sybase last October licensed Tivoli Systems, Inc.'s object-oriented Advanced Development Environment. In addition, Tivoli is working directly with Sybase to develop its system management suite.

According to Colton, the new products, scheduled for introduction in the first quarter of 1994, will give users extensible control over virtually all equipment and services implemented in a distributed client/server network. That control extends to Unix workstations and servers, personal computers, peripherals, electronic and voice mail services, and even control systems for industrial machines and robots.

With its modular and object-oriented design, the system will allow administrators to add or exclude various object types and provide overall control of all network objects through a single console.

One example of how system management will be simplified, Colton explained, is through the use of icons.

For example, an icon representing a new employee could be dragged and dropped into the proper location, and all the employee's telephone calls, electronic mail, voice mail and the like would be automatically directed to that location, eliminating time-consuming network configuration procedures.

♦ Kellar is a Tokyo correspondent for IDG News Service.

Notes

Continued from page 86

information systems at Global Petroleum Corp. in Waltham, Mass.

Shelton said his company purchased the Starter Pack to help it brainstorm ways of using Notes to consolidate data from different sources into an application that would analyze inventory and manage risk. He plans to develop a prototype of the application to demonstrate it to upper management.

If management approves the expenditures needed to deploy the application enterprise-wide, Shelton and his team would develop a production version that runs on OS/2 Notes servers or other high-performance server platforms, such as Novell, Inc. NetWare, Unix and Windows NT, which Lotus plans to make available later this year.

Quality Decision Management, Inc. (QDM), a Lotus Business Partner based in North Andover, Mass., is using the Windows server to reduce the number of laptop computers that staff members need to demonstrate their Notes-based groupware product, Quality at Work.

Currently, staffers need to carry two laptops — one that serves as a Notes OS/2 server and the other that functions

as a Notes client.

With the Windows server version, staffers only need to carry one laptop, which functions both as a Notes client and server.

"As a start-up, purchasing multiple laptops for every marketing person can chew up a lot of precious cash," said QDM President Andrew Jeffrey.

He added that his company will offer Quality at Work on all Notes server platforms, including the Windows server version. However, he is unsure whether many users will purchase the Windows server version of Quality at Work because the software will only support six or seven users at most.

The Windows server version of Notes typically can support 10 users, but Quality at Work adds about 33% overhead to normal Notes server processes, Jeffrey said.

Notes developer Ozzie said he has no plans to expand the number of users that the Windows server can support. Companies that want to support more than 10 users on the Windows platform must either add another Windows server or migrate to another Notes server platform.

Merrick Printing Co. has 30 Windows users and a dozen Macintosh users on separate networks linked via an electronic mail gateway. Merrick said he would like Lotus to develop a Macintosh client for the Windows server version, which currently supports only Windows or OS/2 clients. □



BILL O'CONNELL

OZZIE

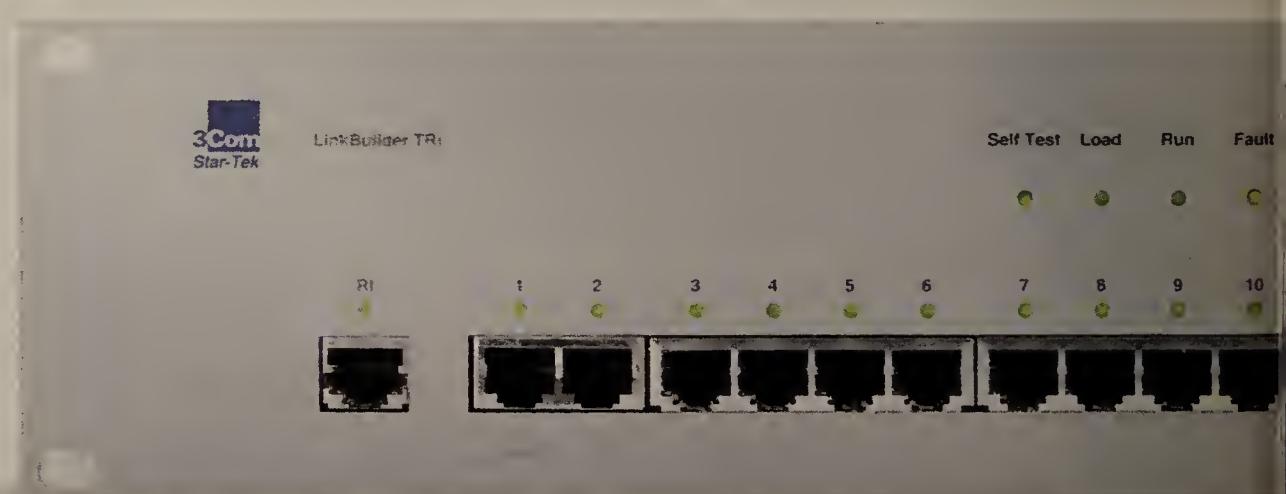
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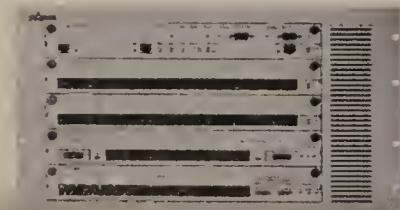
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LinkBuilder Focus

Our hubs support all popular grades of twisted-pair cable to twice the distance of most other Token Ring hubs. So you can stop worrying about your cabling.

Global MHS

Continued from page 86

agencies using the new messaging service, he found that the names were not always unique or meaningful across agencies. As a result, the state has had to go back and rename servers, a complex and time-consuming process, Hoffman said.

"This is something all NetWare administrators can't think about enough up front," he said.

WISH LIST

Hoffman's NetWare Global MHS wish list includes some sort of support for Banyan Systems, Inc.'s StreetTalk, which he considers the best directory service. While Novell has added new directory services to NetWare 4.0, the state uses a variety of NetWare releases, and a massive upgrade to 4.0 anytime soon is unlikely, he added.

Hoffman would also like to see Novell allow for simple integration of existing MHS directories and NetWare Global MHS directories.

Another user site, the News and Current Affairs Department of British Broadcasting Corp. (BBC) in London, is evaluating a single copy of NetWare Global

MHS with the intention of deploying the software at three sites for basic interpersonal messaging.

Cliff Penton, systems development manager for BBC News and Current Affairs, said installing NetWare Global MHS should enable the company to simplify its existing MHS 1.5 messaging backbone, which requires separate message storage and routing servers.

The department plans to use Novell's SMTP module to provide communications between SMTP and MHS mail users. Penton said the address alias capabilities of NetWare Global MHS enable

The BBC News and Current Affairs Department, which already uses an NLM version of Cheyenne Software, Inc.'s ARCserve local-area net backup software, was glad to see NetWare Global MHS delivered as an NLM.

"I don't like having PCs all over the place doing value-added services," he said. "NLMs save us space and simplify maintenance."

Earl Martin, president of Novell reseller and systems integrator TechForce Corp. in Tampa, Fla., likewise said the fact that NetWare Global MHS runs as an NLM was a primary benefit.

TechForce is using NetWare Global MHS to support a message-based service accounting package that it uses to serve its customers. The single-server system supports about 50 Da Vinci Systems Corp. mail users and has been in use for about seven months, replacing a NetWare MHS system that required a separate NetWare and NetWare MHS server.

"It frees up resources for us and is easier to maintain," Martin said. "The potential downside

is that if the server goes down, we lose our LAN and our messaging system."

BRIEFS

Continued from page 86

Fireworks Partners, a new IBM unit responsible for the formation of businesses that use multimedia technologies.

Starlight Networks, Inc. will develop a NetWare Loadable Module version of its StarWorks video networking software. This would allow users to employ a NetWare server as a dedicated video server on NetWare local-area nets. StarWorks runs on Unix servers and supports DOS, Windows, Macintosh and Solaris clients. It enables multiple users to access the same or multiple videos stored on a StarWorks server across a LAN.

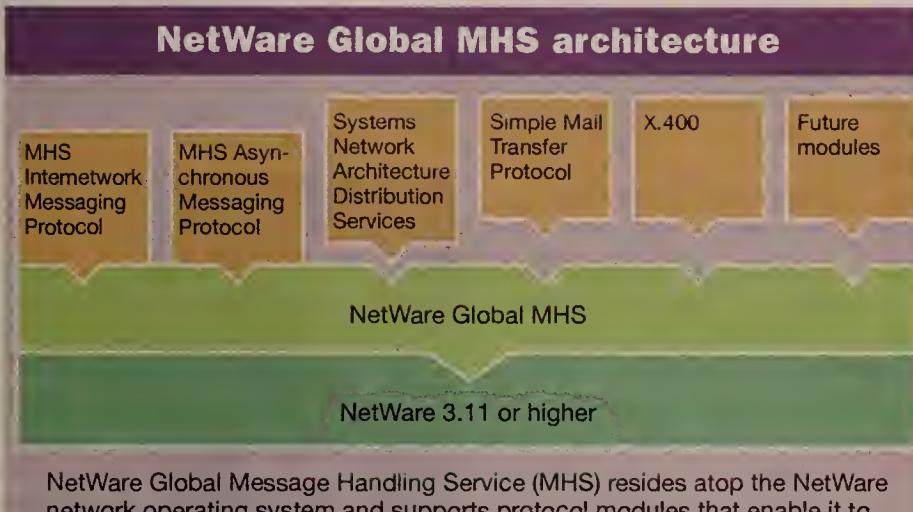
Starlight Networks: (415) 967-2774.

Xitel, Inc. is shipping a new version of its E-mail gateway that links Novell, Inc.'s Message Handling Service (MHS) to Digital Equipment Corp.'s VMSMail. XitLink provides higher capacity and greater flexibility in addressing and configuring electronic mail systems. It costs \$7,000.

Xitel: (215) 647-2866.

Four Seasons Software has announced 4S-Report, a report writer that runs on Unix, DOS and Digital Equipment Corp. VMS platforms. The 4S-Report tool can access data from proprietary databases or integrate data from multiple databases into a single database. Available now, the report writer costs from \$300 to \$37,000, depending on platform configuration.

Four Seasons Software: (908) 248-6667.



NetWare Global Message Handling Service (MHS) resides atop the NetWare network operating system and supports protocol modules that enable it to work with different mail systems.

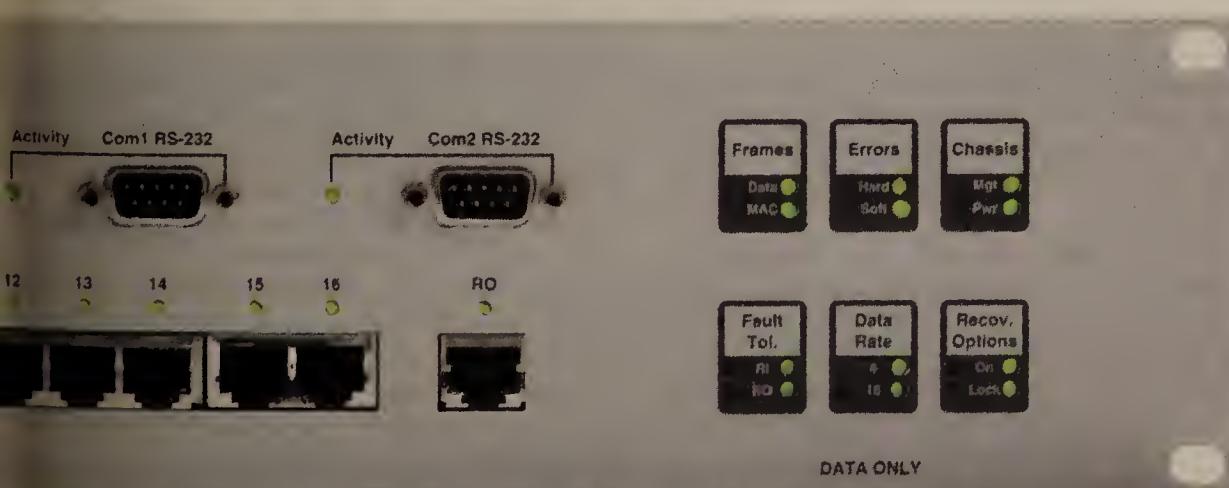
GRAPHIC BY SUSAN J. CHAMPEY

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the messaging between different E-mail systems to be transparent to end users.

is that if the server goes down, we lose our LAN and our messaging system."

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Editorial

Enough is enough already.

It's time vendors stop the type of shameful, petty and self-serving behavior exhibited earlier this month at an IEEE meeting in Denver. At the meeting, the IEEE 802 executive committee voted to move a 100M bit/sec Ethernet standard, proposed by Hewlett-Packard Co. and AT&T with the backing of 30 vendors, into a new subcommittee — 802.12 — because it uses a proprietary signaling scheme instead of Ethernet's Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

Proponents of the HP-AT&T plan say the decision means that a draft standard could be reached by early 1994 — nearly a year before it is expected.

The action left a CSMA/CD-based 100M bit/sec Ethernet standard proposed by 3Com Corp. and SynOptics Communications, Inc. — with backing from 54 vendors — as the top contender in 802.3, meaning it could reach draft standard sooner, right?

Wrong. The executive committee deferred by four months a decision on whether the 802.3 or another new subcommittee will steer development of that standard. Why wait four months to decide what to do with the proposal that, by keeping Ethernet's media access control layer virtually intact, has more of a claim to 802.3 than any other proposal? Are the powers that be trying to give the HP-AT&T proposal an advantage by letting it get to draft status first? No one will ever know the answer to that.

But here's the best part. The voting process was fraught with "irregularities." Because of controversy swirling around the vote to move the HP-AT&T proposal into a new subcommittee and postpone a decision on the fate of the 3Com-SynOptics proposal, the executive committee was forced to meet the next morning to verify its action.

A certain amount of maneuvering is inherent in the standards process, but it's time to draw the line. In the case of fast Ethernet, vendors are putting political concerns before user needs, and that is wrong.

While both proposals were given project status — which all but ensures two draft standards — failing to decide now who will oversee development of the 3Com-SynOptics proposal enshrouds it in a cloud of doubt. The executive committee should have kept development of the 3Com-SynOptics proposal in 802.3, where it belongs. This would've made it more likely that alternative standards-based products would hit the market at the same time.

♦ SKIP MACASKILL

Teletoons

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- RULE 52 -

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So... you like to travel?

SECURITY PERSPECTIVES

By Michel Kabay

Jurassic Park's net security policies are prehistoric

The current hit movie *Jurassic Park* stars several holdovers from 65 million years ago. It also shows errors in network security that seem to be just as old.

For those of you who have just returned from Neptune, *Jurassic Park* is about a dinosaur theme park that displays live dinosaurs created after scientists cracked extinct dinosaur DNA code recovered from prehistoric mosquitoes.

The film has terrific live-action dinosaur replicas and some heart-stopping scenes. It also dramatizes awful network management and security. Unfortunately, the policies are as realistic as the dinosaurs.

Consider a network security risk analysis for *Jurassic Park*. The entire complex depends on computer-controlled electric fences and gates to keep a range of prehistoric critters from eating the tourists and staff. So at a simple level, if the network fails, people turn into dinosaur food.

Jurassic Park's security network is controlled by an ultramodern Unix system, but its management structures date from the Stone Age. There is only one person who maintains the programs that control the security network.

This breaks Kabay's Law of Redundancy, which states, "No knowledge shall be the property of only one member of the team." After all, if that solitary guru were to leave, go on vacation or get eaten by a dinosaur, you'd be left without a safety net.

Jurassic Park's security system is controlled by computer programs consisting of two million lines of proprietary code. The critical programs are not properly documented.

An undocumented system is, by definition, a time bomb. In the movie, this bomb is triggered by a vindictive programmer who is angry because he feels overworked and underpaid.

One of the key principles of any good security system is the belief that people are the most important component. Disgruntled and dishonest employees cause far more damage to networks and computer systems than hackers.

The authoritarian owner of the park dismisses the programmer's arguments and complaints, as if owning a bunch of dinosaurs gives him the privilege of treating his employees rudely.

He pays no attention to explicit indications of discontent, including aggressive language, resentful retorts and sullen expression.

If the owner had taken the time to listen to his employee's grievances and taken steps to address them, he could have prevented several humans from becoming dinosaur meals.

Bad housekeeping is another sign of employee discontent. The console where the disgruntled programmer works looks like a garbage dump; it's covered in coffee-cup fungus gardens, historically significant chocolate-bar wrappers and a treasure trove of recyclable soft-drink cans.

You'd think that a reasonable manager would be alarmed simply by the number of empty calories per hour being consumed by this critically important programmer. The poor fellow is so overweight that his life

expectancy would be short even if he didn't become dinosaur fodder.

Ironically, the owner repeats, "No expense spared" at several points during the movie.

It doesn't seem to occur to him that with hundreds of millions of dollars spent on hardware and software — not to mention the buildings and grounds of the entire private island housing the park — modest raises for the staff would be trivial in terms of operating expenses but would be a significant boost for its morale.

In the movie, the network programmer is bribed by competitors to steal dinosaur embryos. He does so by setting off a logic bomb that disrupts network operations completely.

The network outage causes surveillance and containment systems to fail, stranding visitors in rather uncomfortable situations.

When the systems fail, for some reason, all of the electric locks in the park's laboratory are instantly switched to the open position.

Why aren't they automatically locked instead? Typically, when a security controller fails, the default should be to keep security high, not eliminate it completely.

Manual overrides such as crash bars (the horizontal bars that open latches on emergency exits) can help to provide emergency egress without compromising security.

As all of this is happening, a tropical storm is bearing down on the island. The contingency plan appears to consist of sending almost everyone away to the mainland, leaving a pitifully inadequate skeleton crew.

The film suggests that the skeleton crew is not in physical danger, so why send essential personnel away?

Contingency plans are supposed to include redundancy at every level. Reducing the staff when more is needed is incomprehensible.

At one point, the systems are rebooted by turning off the power on the entire island. This is equivalent to turning the power off in your city because you had an application failure on your personal computer.

Talk about overkill: Why couldn't they just power off only the computers themselves? Where were the Dinosaur Prevention, Mitigation and Recovery Planning consultants and experts when the park was being designed?

Surely everybody should know by now that the only way to be ready for dinosaurs, uh, disasters, is to think, plan, rehearse, refine and update.

Didn't anyone think about what would happen if the critters got loose? Where were the fail-safe systems? The uninterruptable power supplies? The backup power generators? Sounds like Stupidosaurians were in charge.

We may be far from cloning dinosaurs, but we are uncomfortably close to managing security with all the grace of a brontosaurus trying to type.

I hope you see this film. And bring your boss.

♦ Kabay is director of education with the National Computer Security Association in Carlisle, Pa. He can be reached on the Internet at 753.3232@compuserve.com or by phone at (717) 258-1816.

By Mark Seecof

Darkness on edge of carrier net

Many local telephone companies are shirking their duty to provide "dark-fiber" services. The Federal Communications Commission and state regulators should compel them to provide dark fibers. Regulators should also force telephone companies to implement cost-based pricing for basic fiber services and use it to account for the companies' own fiber costs.

Dark fibers are fiber cables that are routed between user sites via telephone company cableways such as service tunnels and utility poles but are not connected to telephone company terminal equipment. This equipment emits the light to carry data through a fiber link and converts data between optical and electronic forms so devices such as Asynchronous Transfer Mode switches can communicate over fiber. The bandwidth of a fiber link depends mainly on the power of the terminal equipment attached to it. Dark-fiber users supply their own terminal equipment and may upgrade it to increase bandwidth without involving the telephone company.

Users need the telephone companies to provide dark fiber because only they have legal authority to run cables across public and private property. The telephone companies wield the power to override property lines as agents of public policy fostering communications.

Dark fiber is the leased line of the '90s; it is analogous to the direct copper circuits that tele-

phone companies have long leased to users. As with leased lines, dark-fiber cable costs are virtually fixed, while terminal equipment costs constantly decline. Leased-line users have always bought faster modems to send more data without increasing phone expenses. Similarly, users want dark fiber so that when they purchase new terminal equipment to increase bandwidth, they can capitalize that cost and gain tax advantages.

But telephone companies are greedy. They want to own the terminal equipment for all fiber links and charge users monthly for the bandwidth they require, forcing users that need more bandwidth to pay higher telephone bills

forever, instead of paying one-time costs to upgrade terminal equipment. Only telephone company abuse of monopoly power can force this scheme on users because it is not economically rational for users. It is also bad public policy — it amounts to a private tax on the growth of businesses using fiber communications, transferring fiber users' profits to telephone companies. Since the fiber cabling doesn't change, telephone companies do nothing to earn that money.

The telephone companies do sell access to a limited resource — not bandwidth, but cableway space. The FCC should require telephone companies to charge for dark fiber in proportion to com-

peting demands for the space it takes up in cableways. The minimum price should reflect fiber and labor provisioning costs. At that price, the demand for space might exceed capacity on some routes, so the price for fiber on those routes should be raised until demand falls below capacity. Usage-sensitive pricing is inappropriate because the telephone companies' costs are not affected by the way users employ their fiber links.

These companies might try to pad dark fiber rates by crowding cableways with underutilized fibers carrying telephone company traffic, thus creating artificial demand for cableway space.

To prevent this, they should account for their own fiber cost — the cost to install and maintain fiber, excluding terminal equipment — under the tariffs they impose on dark-fiber users. Then, when telephone companies apportion those costs to customers in the rate cases they submit to regulators, any padding will become apparent. Regulators can then intervene on behalf of users.

The FCC should remind telephone companies of their bargain with the public: to provide beneficial services such as dark fiber in exchange for the power to cross property lines. Dark fiber is a rational conduit for modern communications, and public policy obligates telephone companies to provide them. These companies are avoiding public service, and the FCC should set them straight.

— Seecof is a system architect at the *Los Angeles Times*. His opinions do not represent *Los Angeles Times* or Times-Mirror Corp. policy. He can be reached via the Internet at marks@latimes.com.

at marks@latimes.com.



Letters



Secure products, not laws needed

I disagree with Craig Paul's reasoning that the current antiscan laws are not strict enough (July 5, page 33). The laws are far too strict and for all the wrong reasons.

The whole concept of outlawing scanners that can receive cellular frequencies is a sham foisted on us by the cellular communications equipment manufacturers. Instead of designing their products to protect the user in the first place and rather than fixing their mistake by redesigning the products, the manufacturers have elected to lobby Congress to pass laws restricting the rights of the American people — who, after all, "own" the airwaves.

And what's the point of the scanner laws? Simple: When John Q. Public goes down to Cell-Phones-R-Us, the salesperson can assure him that this new-fangled phone is

secure. After all, "nobody can receive those frequencies." John Q. Public, who hasn't a clue how these things work anyway, accepts this statement as gospel truth.

Of course, as most of your readers know, this reassurance is quite simply a lie. Anyone can purchase a scanner for a few hundred dollars, and most scanners can be modified to receive cellular frequencies with a

little effort. With a little more effort, you can construct your own receiver from scratch. The scanner laws, being totally unenforceable, provide little, if any, deterrent.

The proper solution to the problem of illicit monitoring of cellular communications is to require the manufacturers to produce a secure product. Encryption technology is not expensive; it should not increase

the cost of a cellular phone by more than a few dollars. And encryption, unlike misguided legislation such as the scanner laws, actually works.

Dave Curry

Systems programmer
Purdue University
West Lafayette, Ind.

(Note: The opinions expressed do not necessarily reflect those of Purdue University.)

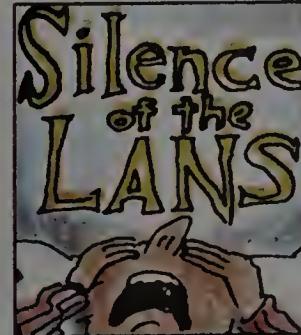
Telling Toon

Thank you for the absolutely wonderful *Teletoons* "ad" for The Network Lifer's Book Club (June 28, page 71). Our staff could have been coauthors on several of the titles listed.

Is there a poster or reprints available for purchase? There are several of us interested in them.

Thanks for a great diversion! Keep up the good work.

Eric Siglin
Senior programmer/analyst
Products Division
Cincinnati Milacron, Inc.
Cincinnati



Editor's note: Article and chart reprints (minimum 500 copies) can be ordered from Donna Kirkey, Network World's reprint manager, by calling (800) 622-1108.

Can't legislate security

Craig Paul's column on scanner laws misses the point. Telecommunications is neither private nor secure, and no law can guarantee that only the intended recipient will receive your message.

There are probably millions of cellular-capable scanners, satellite receivers, personal computer-based trace tools, fiber-optic snoops and similar devices out there just waiting to intercept your message. If all of these nonintended recipient devices were outlawed tomorrow, they would still exist and be used for decades to come.

See Letters, page 97

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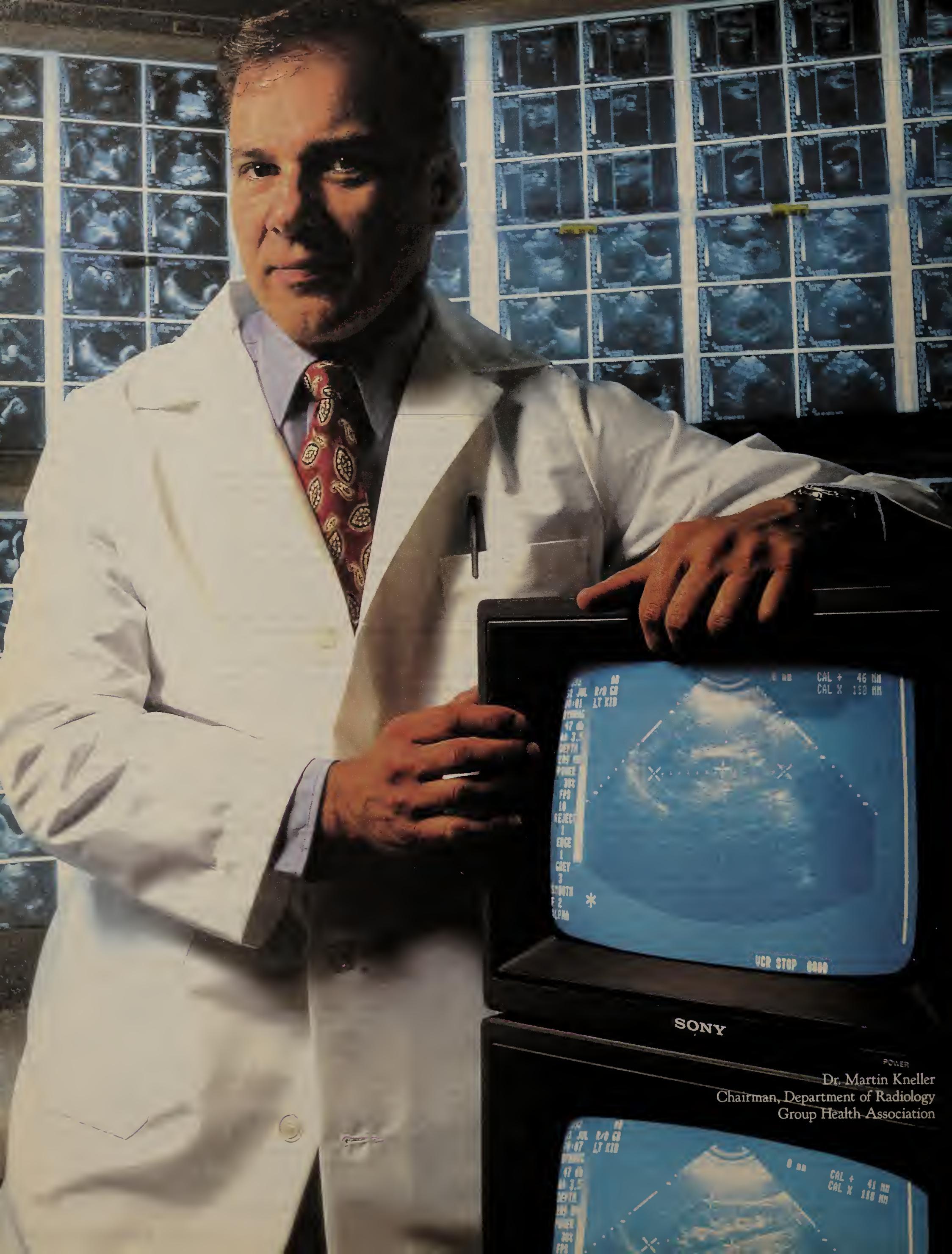
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Keeping it simple

By
Mark
Miller

A new version of the popular SNMP management protocol promises to give users the tools they need to manage the enterprise.

The rise of the Simple Network Management Protocol has enabled users to monitor and control activity on LAN internets in ways they never would have dreamt possible.

One SNMP guru has used the technology to monitor rest room usage in a small trailer used by software developers. When the lavatory is occupied, a small icon of an outside display shows a closed door. And when the facility is vacant, the door appears ajar; some workstation users with audio capabilities even hear a simulated toilet flushing.

Some pundits even predict that SNMP will eventually surface in homes, controlling such devices as toasters and compact disc players. Such are the spoils of network management technology.

But SNMP has undergone a face-lift of sorts, spearheaded by a handful of principals who have evolved the net management protocol suite by implementing security functions, devising a more streamlined approach for grabbing data in bulk form and allowing SNMP managers of various brands to share data, among other changes.

The upshot for users is that vendor products that support SNMP Version 2 should provide much better performance over a broader range of network types and will, for the first time, offer robust facilities that provide an adequate base for securing SNMP messages.

These enhancements, along with others, make it worth a network manager's while to examine the benefits of SNMPv2. And then, even if the benefits of SNMPv2 are compelling, users would do well to consider the best strategy for supporting a mixed net management environment where SNMPv1 still plays a crucial role.

PLAIN AND SIMPLE

For those unfamiliar with the technology, SNMP is the net management protocol suite used by managers and agents to carry data. SNMP is based on a model that includes management stations, which monitor and control managed elements. To keep with its theme of simplicity, the vast majority of the work is done by the management stations — called managers — with minimum effort required by an agent process within the managed device. By keeping the agent processing overhead low, vendors are encouraged to include the agent software within their product, thus assuring manageability for their bridges, routers or other internetworking devices.

But SNMP is only a part of what is known as the Internet Network Management framework; the entire picture includes the Structure of Management Information (SMI), Management Information Bases (MIB), in addition to the protocol.

The SMI defines the mechanisms that are used to define and identify the managed objects. A managed object could be thought of as a specific kernel of information regarding a managed element. For example, the transmission speed, physical address and number of incoming packets containing errors would all be unique, managed objects for a router's local-area network interface.

SNMP uses a subset of the International Standards Organization's Abstract Syntax Notation One language to specifically define those managed objects.

A MIB puts these managed objects into an organized database. In addition to the Internet-standard MIB, other MIBs — either unique to a device such as a bridge or

unique to a specific vendor's products — are also published.

Therefore, to improve on SNMP, enhancements had to touch all three areas of the Internetwork Management Framework — the SMI and the MIB, in addition to the protocol.

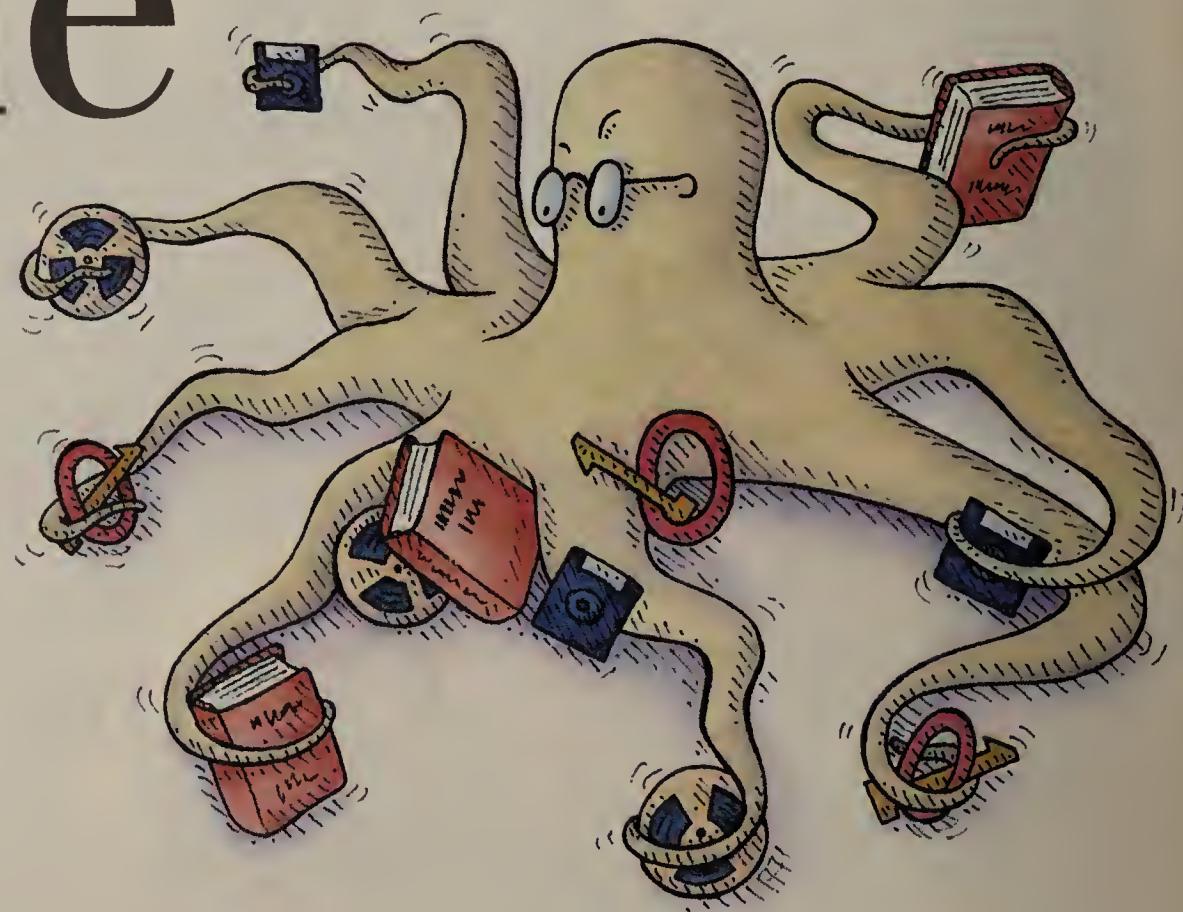
The redesign was a substantial effort, according to Jeffrey Case, president of SNMP Research, Inc., in Knoxville, Tenn., and one of four researchers that formed the nucleus of the SNMPv2 effort.

Case teamed with Keith McCloghrie, also one of SNMP's original authors and now director of engineering at Hughes LAN Systems, Inc., Marshall Rose of Dover Beach Consulting in Mountain View, Calif., and Steven Waldbusser, manager of network development at Carnegie Mellon University in Pittsburgh, to merge their Simple Management Protocol (SMP) proposal with SNMP security enhancements to form SNMPv2.

"We couldn't have a situation where security got deployed in 1992-93; we change the protocol in 1993-94, alter the SMI in 1994-95 and diddle the MIBs in 1995-96," Case says. "This would just be untenable. So we had to do it big time in one chunk. Hence, what you see is what you get: 400 new pages of specifications with reference implementations."

STREAMLINED OPERATIONS

Many of the enhancements in the 400 pages are contained in the SMI and MIB documents that will end up as revisions to software developers' code. For example, new data types are defined for 64-bit counters (instead of the former 32-bit counters) that are designed for high-speed



network use. Provisions to use Open Systems Interconnection addresses are included, as well. For end users, enhancements to the protocol operations will make day-to-day network management much easier.

SNMP messages typically consist of a security wrapper and an SNMPv2 Protocol Data Unit (PDU) (see Figure 1, this page). With SNMPv1, two structures were used: one for the GetRequest, GetNextRequest, GetResponse and SetRequest PDUs, and another for the Trap PDU. Under SNMPv2, all of these messages are formatted with identical syntax, which facilitates code development.

In addition, two new PDUs are defined: the InformRequest and GetBulkRequest. InformRequest is used to communicate information between two management systems. For example, one manager can use the PDU to inform another of certain conditions on its network.

MANAGING IN BULK

The GetBulkRequest is used to obtain large quantities of management information via a single request and is considered to be one of the key SNMPv2 enhancements along with SNMPv2's security and multiprotocol transport enhancements.

GetBulk, as it is more commonly known, will allow users to issue a single request for a whole string of data that may be part of a table, for instance. This type of request should help reduce network bandwidth demands by sending a single request for a blob of data, as opposed to the net taking many hits due to a string of GET or GetNext requests.

"Probably the first thing the end user will notice is the performance increase as a result of GetBulk," Waldenbusser says. "It is a simple but dramatic improvement, especially for those that were having problems dealing with large amounts of data that might come from large routing tables, bridge forwarding tables of the [Remote Monitoring] MIB."

GetBulk figures prominently for bridge/router maker Sumitomo Electric U.S.A., Inc. in Santa Clara, Calif. "Bulk data retrieval is a feature that will help us better support our bridge and router customers," says Kent Tsuno, senior manager of fiber-optic communications systems at the firm. "Our private MIB contains some very large tables that detail the system configuration, topology and status. When we assist customers with remote network troubleshooting, we often have to retrieve the contents of these tables." GetBulk, he says, will streamline this process.

MULTIPROTOCOL SUPPORT

As an application layer protocol, SNMP relies on underlying transport and network layers to complete the communications infrastructure. The SNMPv1 infrastructure was designed to run over Transmission Control Protocol/Internet Protocol and User Datagram Protocol/IP networks.

SNMPv2 changes that by adding options for SNMP traffic to run over AppleTalk, OSI and Novell, Inc. Internetwork Packet Exchange (IPX) nets, as well (see Figure 2, page 96).

SNMP Research's Case says the additional transport protocol support makes it possible for a user with a management station in Chicago to handle a non-TCP/IP LAN in Cincinnati. A management query would be sent to Cincinnati as TCP/IP, then be encapsulated in IPX for local transmission. The response is received in IPX, and the IPX envelope is removed and sent back via TCP/IP. Additional overhead is required to perform the mapping function between the IP and IPX addresses. However,



this can be done in a table function.

"The alternative is that you can't talk to [the non-TCP/IP network]," Case says.

Expanded transport support will certainly help SNMP users, as will a richer set of error codes that not only specifies a problem, but clues users in to the source of the error. These are important when a manager uses the SET PDU to instruct an agent to write an object value, for

instance. If that type of operation failed under SNMPv1, a GetResponse PDU with an error code of badValue would be returned. By contrast, SNMPv2 would be much more explicit, returning one of a number of error codes, including wrongType, wrongLength, wrongEncoding or wrongValue. The upshot is that SNMPv2 not only says there's a problem, but it also gives the user a pointer to it.

SECURITY MADE SIMPLE

One of the common hits that SNMPv1 took was that it lacked the necessary level of sophisticated security needed by enterprise network managers.

SNMPv1 handled security of the management information in a rather simplistic fashion; it used the Community Name. The Community Name within the SNMP header provided all of the message security capabilities. This provision, known as the trivial protocol, assured that both the agent and the manager recognized the same Community Name prior to continuing with network management operations. This shortcoming prompted many network managers to restrict their net manage-

ment to just monitoring functions (read-only), by disallowing the issuance of SET commands, which would change the configuration parameters of a remote device.

The upshot is that users shied away from SET commands because Community Name — security in the most basic form — could allow unauthorized users to alter parameters, potentially without users knowing that anything had been altered.

Realizing this deficiency, security enhancements to SNMPv1 were published in July 1992 (RFCs 1351, 1352 and 1353) and became the foundation for the SNMPv2 security structure.

The SNMPv2 security standards now define methods of assuring both the authentication and privacy (via encryption) of network management communications. Authentication provides a means of reliably identifying the originator of the message, while privacy indicates a means for the message to be protected from disclosure.

Secure communication demands that relationships between the various SNMPv2 entities be understood. The basis for the model of these relationships is the concept of the SNMPv2 "party." The party is a unique set of security parameters, which could include the network location, plus authentication and privacy protocols to be used between an agent and a manager. A party may, for instance, define the authentication protocol, type of encryption, maximum message size and even a private key to be used.

Secure SNMP messages are then transmitted between two parties. An SNMPv2 entity, however, could define multiple parties, each of which could have different parameters. For example, different parties could use different authentication or privacy protocols; so one SNMP manager, for instance, may use one key for one agent and a different key for yet another agent. For communication to occur, all of the party parameters, plus related protocol parameters such as encryption keys, must be validated, as well. When security is imple-

Continued on page 95

Vendors embrace SNMP

A random sampling of vendors indicates that most are committed to rolling out support for the latest release of the Simple Network Management Protocol suite, although some suppliers may not totally embrace the technology.

AT&T's NCR Network & Systems Management Division, which oversees the company's StarSentry products, plans to offer support for SNMPv2, says Mark Finkernagel, senior product manager at the company. NCR plans to roll out SNMPv2 support in early 1994 when it ships its OverLord net management offering.

Leading hub vendors Cabletron Systems, Inc. and SynOptics Communications, Inc. both plan to roll out SNMPv2 support this year.

Cabletron plans to offer SNMPv2 support between the third quarter of this year and first-quarter 1994, says Roger Dev, director of engineering and manufacturing at Cabletron. The company does not plan any price changes as a result of the upgrades.

Chiccom Corp. says it will offer SNMPv2 support when customers demand it.

IBM, too, says it will serve up SNMPv2 products sometime next year but is tight-

ipped about details.

Vendors unanimously agree that, of all SNMPv2 features, the security facilities will mean the most to users.

One area where some vendors are less committed to full SNMPv2 support is manager-to-manager communications. Some vendors do not see SNMPv2 as a death knell for Common Management Information Protocol (CMIP). NCR's Finkernagel envisions SNMP coexisting with CMIP managers.

"Our view is that CMIP will own the platform-to-platform shared management knowledge, and SNMP and SNMPv2 will own the platform-to-agent knowledge," Finkernagel says.

Cabletron's Dev says SNMPv2 may hurt CMIP deployment if it continues to evolve at a rapid clip.

"SNMPv2 is still a primitive, low-level protocol," Dev says. "It will have to evolve significantly."

IBM's Rick Silletti, manager of enterprise management product support, says SNMPv2 does not spell a death knell for CMIP. "Customers are asking for both," he says.

BY CHARLES BRUNO

Continued from page 94

mented, the authentication and privacy information is placed within a "wrapper," which precedes the SNMPv2 PDU.

Vendors that implement SNMPv2 use two protocols for the security aspects: the Digest Authentication Protocol and the Symmetric Privacy Protocol. The Digest Authentication Protocol verifies message integrity (ensuring that the message received is the same as the message sent) and message origin. The Symmetric Privacy Protocol is used to assure message privacy. This protocol depends on the message's encryption according to a secret key

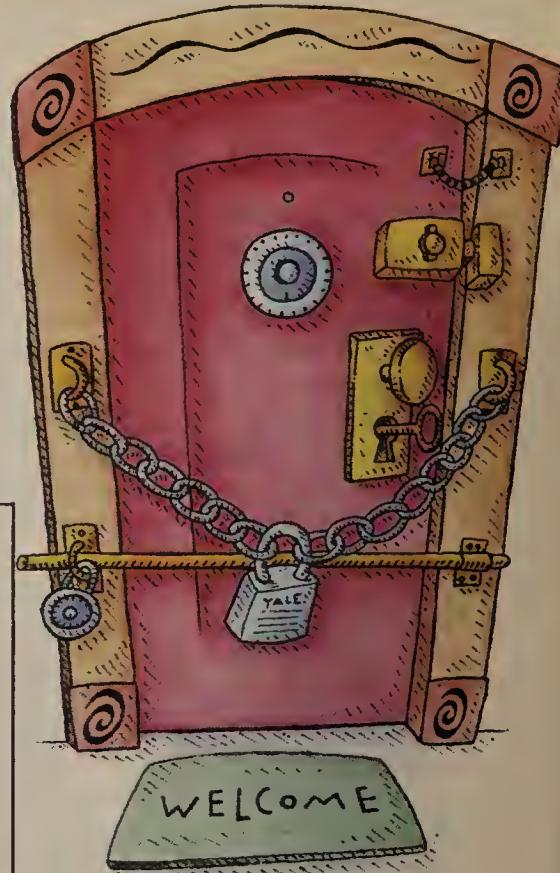
that is only known to the originator and recipient.

Additionally, the encrypted message must be authenticated as described above. The algorithm uses the Data Encryption Standard (DES), which is subject to export restrictions and licensure.

The extent to which vendors will implement the security features remains an open issue. "Perhaps 95% of the vendors will implement the authentication portion," says Hughes LAN Systems' McCloghrie. "The [DES] encryption is optional, and I expect that some [vendors] will and some won't."

One of the challenges for vendors is to implement the security features with simple user interfaces, which will shield users from the complexity of the security systems and increase the chances of them being used, McCloghrie says.

Vendors say the additional security levels will force users to rethink how they used SNMP across their nets. "The flexibility and robustness of the SNMPv2 security functions may require users to alter or change their operational policies and procedures," says Joe Matibag, senior product manager at SunConnect in Mountain View, Calif.



"Beyond defining simple community strings, network managers will now have to concern themselves with defining and tracking who has access to what piece of the management information," Matibag adds. "To minimize the impact and cost of these changes, management platform and device vendors will be challenged to provide a simple way, perhaps using object-oriented technologies, to initialize, configure and install these various

More SNMP via the Internet

Two nontraditional sources of information are available about Internet network management in general and Simple Network Management Protocol in particular.

The first is "The Simple Times," an on-line newsletter edited by Marshall Rose. This publication is freely available via the Internet in both PostScript and MIME versions, and also in hard copy. For further information, send an Internet message to:

st-subscriptions@simple-times.org

Separately, users may join either of two Internet mailing lists, which provide an entree to discussions on network management topics.

The SNMP mailing list (snmp@psi.net) is devoted to SNMP-related topics, while the Remote Monitoring (RMON) mailing list (rmonmib@jarthur.claremont.edu) discusses RMON and developments with the RMON Management Information Base.

To join one of the lists, send a message with "request" appended to the first part of the address to:

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BY MARK MILLER

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SNMPv2 security capabilities."

ONE MANAGER TO ANOTHER

Just as users have longed for more robust security in SNMP, they are finally getting another wish in manager-to-manager communications.

Fundamental to the SNMPv2 enhancements is the notion that a network management entity may act as a manager, an agent or both a manager and an agent.

This concept allows users to deploy SNMP in a hierarchical structure, where local managers report to mid-level managers, which, in turn, report to a

Moreover, this MIB should finally allow various brand managers to interact with one another.

Jon Saperia, network technology consultant at Digital Equipment Corp., views hierarchical management systems as load-sharing devices for large-scale networks.

"A management station can be configured to manage a group of network entities, only 'sharing' relevant information with other management platforms on an as-needed basis," Saperia says.

This will help to reduce unnecessary network traffic, he explains. With this approach, a key network resource could be monitored by a single management system.

Alerts to the other managers would be sent only when critical events such as the unavailability of hardware or software resources occur.

MAKING THE TRANSITION

The enhancements to SNMP are certainly compelling. Undoubtedly, users will want to take advantage of products based on SNMPv2. But the fact is, many users have too many investments in SNMPv1 to simply throw it all away and start anew.

SNMPv2's authors knew this and planned for a gradual migration to the technology. With SNMPv2, there are two approaches that can be used to maintain investments in SNMPv1 products: proxy agents and bilingual managers. The proxy agent performs a translation between SNMPv1 formats to and from SNMPv2 messages.

When translating from SNMPv2 to SNMPv1, GetRequest, GetNextRequest or SetRequest PDUs are passed from the manager directly to the SNMPv1 agent. The agent then translates GetBulkRequest PDUs into GetNext PDUs.

For translating from SNMPv1 to SNMPv2, the GetResponse PDU is passed unaltered to the manager. An SNMPv1 Trap PDU would be mapped to a SNMPv2 Trap PDU, with slight modifications. The other alternative, the bilingual manager, supports both SNMPv1 and SNMPv2 protocols concurrently and performs no translations.

The bilingual SNMP manager identifies that an agent is conversing in Version 1 or 2 formats and communicates in that dialect. Thus, the protocol selection, SNMPv1 or SNMPv2, should be transparent to the receiving devices.

Choosing which alternative to use should depend on the application.

For example, a proxy agent would be good when users have an SNMPv2 manager in Chicago and want to manage a LAN in a secure facility in Kansas City, Mo., but the links between Chicago and Kansas City are not secure.

For that application, Case says, users could run SNMPv2 between Kansas City and Chicago, put the proxy agent in Kansas City, and convert from SNMPv2 to SNMPv1 inside the Kansas City facility.

At other times, the proxy agent is just another element to configure, another thing to go wrong or another point of failure. Case's firm, SNMP Research, has implemented both the proxy agent and the bilingual manager.



higher level manager.

Each local segment, for instance, could have an SNMP manager, which would, in turn, act as an agent to a more global manager.

This is referred to as a dual role for the SNMPv2 entity. When management requests are received, the entity acts as an agent. When the requested services are performed, that entity acts as a manager.

A new MIB, called the Manager-to-Manager MIB, defines the mechanisms for a manager to request management services from another manager.

For an intensive session on SNMP Version 2, users may wish to attend Internetwork Management: Understanding SNMP and SNMPv2, a seminar series taught by DigiNet Corp. President Mark Miller and sponsored by Network World.

The cost for the one-day seminar is \$395, which includes comprehensive course work materials. Attendees also receive a reference diskette with SNMPv1 and SNMPv2 requests for comment documents from the Internet, as well as a copy of *Managing Internetworks with SNMP*, a new book authored by Miller.

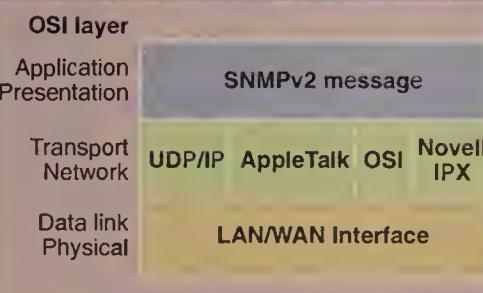
The course will be offered in 13 cities from mid-September through November:

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Dallas	Sept. 14
Boston	Sept. 27
New York	Sept. 28
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Atlanta	Oct. 20
Orlando, Fla.	Oct. 21
Minneapolis	Nov. 16
Chicago	Nov. 17
Pittsburgh	Nov. 18

For further information, contact Network World at (800) 643-4668.

SNMPv2 multiprotocol transport support

Figure 2



SOURCE: DIGINET CORP., BROOMFIELD, COLO.

TIME WILL TELL

SNMPv2 seems like a vast improvement over its predecessor, which caught on well with users. Logically, it would seem that SNMPv2 is destined for the same success.

But like any technology, the key is availability, and vendor implementations drive that process. There's no doubt that many vendors will support SNMPv2. The question is, just

how much of it will they support?

SNMPv2 promises some security and performance advances that users will want. But some vendors undoubtedly will introduce their own wrinkles, especially in the area of security and manager to manager links.

And vendors that have been working on extending their MIB functionality in SNMPv1 environments may not be so quick to rush to market with SNMPv2 follow-ons.

Still, Case predicts that a number of companies will start their SNMPv2 rollouts next month at INTEROP. He says vendors that don't make SNMPv2 announcements by this autumn will fall far behind.

Only time will tell.

Contributing Editor Mark Miller is president of DigiNet Corp., a Denver-based data communications engineering firm. His latest book, *Managing Internetworks with SNMP*, discusses SNMPv1 and SNMPv2 from the perspective of the network analyst or manager. Miller may be reached via the Internet at mark@diginet.com.

Help desk

Continued from page 2

for a 25-station network, you might want to consider a smaller system. I wouldn't suggest looking into a \$12,000 Workgroup 95 until your network has at least 100 users on it. For 25 to 50 users, I'd look at a new or used Quadra 700 and put your money into the new Appleshare Version 4.0 software instead.

The Quadra 700 is a very fast machine available at a bargain price — usually less than \$2,000 for a bare system. If you can't find a Quadra 700, try a Centris 610. A Centris with 8M bytes of RAM and a 230M-byte hard drive now costs only \$2,100 (with rebate). Dollar per MIP, 20-MHz, 68040-based systems are a great buy.

I'm having some difficulties with the rprinter command on Novell, Inc. NetWare 3.11. If, for any reason, the rprinter installation is interrupted on a workstation — for example, for a reboot during installation — the printer will appear to the system to be in use until the print server is reinstalled. Is there a solution for this?

Miguel Blanco, Pompano, Fla.

900 Support's Ronald Nutter replies:

The reason the printer appears to be in use if the rprinter installation is interrupted is that rprinter is using a Sequenced Packet Exchange (SPX) connection to the server. If you wait a few minutes, the connection will clear.

So far, I have found that the best way to run rprinter at the workstation is to put the following two statements in the autoexec.bat file: Rprinter <print server name> <printer #> -r Rprinter <print server name> <printer #>

The first rprinter statement attempts to find rprinter in the local workstation's memory while the workstation is being booted, unload it and clear the SPX connection to the server. The second statement will then invoke the rprinter correctly.

I have had good luck running rprinter this way on several installations. I would suggest downloading Pserv2.ZIP from NOVLIB, the Novell library on CompuServe that lists all downloadable drivers and patched drivers that Novell has available, to get the latest Pserver.NLM and Rprinter.EXE.

I'm looking for help desk soft-

ware for call tracking with an expert system attached. The ideal package would also be able to track inventory and would have a purchasing system, too. We have evaluated two packages: SupportMagic by Magic Solutions, Inc. and Helpdesk Expert Automation Tool by BenData Management Systems, Inc. Can you suggest some other software?

Ron Traub, Whippany, N.J.

Thomas D'Auria, president of SMA Management Systems, Inc., a White Plains, N.Y.-based management consulting firm specializing in information technology management and technical services, replies:

You might also want to check out IBM's Problem Management Productivity Services (PMPS), a LAN-based OS/2 help desk problem management tool.

This tool handles many repetitive tasks, allowing help desk personnel handle more intellectual tasks. It offers an expert system environment, data collection screens, IBM service dispatch and tracking, management controls and reports, and electronic notification of alerts. PMPS prices start at \$60,000 and include some customized services. For more product information, call IBM at (800) 662-7900, Ext. 6898.

Another help desk tool you can look into is Software Artistry, Inc.'s Expert Advisor (EA). EA performs a number of critical functions: call management, problem tracking, problem routing, diagnostics and management routing. This software is icon-based and has a graphical user interface.

The system can be easily customized since most of the source code is provided with the product. Pricing for EA Version 3.0 for DOS starts at \$45,000, and EA Version 1.0 for OS/2 at \$65,000. Both prices include software for 10 workstations, one day of on-site training and one day of customization training. Software Artistry can be reached at (800) 795-1993.

A third package you may want to investigate is Top of Mind from The Molloy Group, Inc. It offers purchasing and inventory tracking, in addition to call tracking, self-learning intelligence and problem resolution.

Pricing for Top of Mind Version 2.0 for DOS and Windows ranges from \$4,500 to \$22,500 for one to 15 users.

The Molloy Group can be reached at (201) 884-2040. □

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Letters

Continued from page 90

Network managers should look to technology to secure their networks.

Bruce Lerner
Supervisor of technical support
Sierra Pacific Power Co.
Reno, Nev.

Author's response: Due to the editing process, my opinion may not have been as clear as it could have been. Nor was the title of the story one I would have chosen. The title may have predisposed some readers to think the column would advocate even tighter control of future scanners. Instead, here are the main points I wished to communicate:

The "Anti-Scanner Law" did little to enhance the privacy of analog cellular phone calls. Those transmissions are not secure. Any thoughts to the contrary are extremely unwise.

Section 1 of another law, USC 182512, passed in 1988, prohibits manufacture, distribution, possession and advertising of wire, oral or electronic communication interception devices. Yet Section 2 of the law provides an exemption for providers of wire or electronic communications, or any governmental organization, be it federal, state or local. Section 2 sets a bad precedent, as there is currently no need for government agency exemptions. The Federal Bureau of Investigation's proposal to have a tap into any or all "wired" digital U.S. networks has been vehemently opposed by industry and user groups, yet USC 182512 hands government on a silver platter the ability to tap digital cellular communications for no good reason.

While the Cellular Telephone Industry Association (CTIA) vigorously advocated the Anti-Scanner Law, it has done nothing to help secure digital cellular communications from legal (USC 182512 Section 2) and illegal eavesdropping.

We need to push the CTIA to adapt or develop verifiable, strong encryption for digital cellular communications. (The Clipper/Capstone algorithm is classified and, therefore, is unavailable for public scrutiny and testing — it can't be verified.)

The CTIA needs to know that the status quo is unacceptable and that another law, which would restrict acquisition or ownership of radio receivers, is useless.

In Congress, Rep. Ed Markey (D-Mass.) is the proper person to contact regarding these issues. The Federal Communications Commission is

also soliciting proposals regarding privacy-enhancing technology for digital cellular communications. Suggest your favorite encryption technology, including some that are now commercially available but expensive.

Harvard clarifies E-mail efforts

In reference to Scott Bradner's Internet-working Monitor column (May 31, page 21), I'd like to correct a possible wrong impression.

The report on electronic mail that Mr. Bradner mentions does not represent the current thinking of Harvard University or the Network Services Division of Harvard's Office for Information Technology.

Although the recommendations expressed in the report may have been some of the more appropriate ones at the time, experience and rapidly changing requirements have made it necessary to completely review the current and future messaging and directory needs of the extended university.

Several major surveys have been completed, and a requirements document is in the final stages of preparation. Maybe this will lead to a request for information and a design and selection process for a forward-looking electronic messaging and directory system to serve a diverse, rapidly changing environment. Harvard is not alone in this kind of process.

Lance Jackson
Network project manager
Network Services Division
Office for Information Technology
Harvard University
Cambridge, Mass.

Author's response: To preclude individual requests for the E-mail report mentioned in my column, I added a PPS informing readers how to obtain copies via the Internet. Much to my surprise, a few hundred copies of this report were picked up by interested readers (One was picked up more than a month after the column was published.)

I trust that people reading the report noticed the publishing date April 29, 1991. The report represented the conclusions of a diverse group of university technical and management people.

As Mr. Jackson points out, there have been many changes in understanding, standards and implementation in the years since that report was published. Harvard is now reexamining the issue.

This reexamination is far more detailed

than the work of the original committee and involves, among other things, a survey of the university community and its actual needs, something that the original committee did not do.

This reexamination effort is being ably led by Mr. Jackson. I hope to be able to refer to a report on this effort when it is concluded.

Signature debate rages on... and on

Craig Paul's letter (June 21, page 41) commenting on my letter (May 24, page 37) regarding his original letter (April 12, page 41) on electronic signatures leaves me as confused as the beginning of this sentence. It appears that what Mr. Paul is concerned about is plagiarism.

Signatures will not prevent plagiarism but neither will encryption. If Mary sends a term paper to John using an encryption that John can undo (so John can "process" the paper), there is nothing to prevent John from modifying the paper by putting "Written by John" on it, reencrypting it and sending it to Teacher Smith.

The ability to process transmissions (that is, route, file, search for key words and transfer funds) is the most valuable property of signed messages. Protected transmissions (encrypted electronic transmissions or sealed-in-envelope paper transmissions) cannot be processed. The availability of the clear text is of the essence.

Bundling a clear copy with an encrypted copy provides no more protection than just the signature, given equally powerful encryption techniques. Plagiarism is still possible, and the message size is doubled. The signature efficiently assures the recipient that the entity signing the transmission originated that signed copy.

I don't know what Mr. Paul means by "the entity signing the transmission actually was the last to send it." If Mary sends John a signed copy of her paper and John relays it with Mary's signature still appended, Mary will clearly not be the "last" to send it — but it will still have Mary's signature. A signature identifies the originator of that copy — not the last to "touch" that copy.

Both signatures and encryption have distinct and unique roles to play in a secure environment, and neither should be denigrated.

Walt Roehr

Executive director
Telecommunications Networks Consulting
Reston, Va.

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Security with a catch

BY MARK GIBBS

Users considering Microsoft Corp.'s LAN Manager may want to poke their head under the hood since the product's security architecture looks a lot like a collection of spare parts flying in loose formation.

LAN Manager is surely a workable network operating system (NOS), but it has some strange deficiencies and options that not only compromise its utility in large network environments, but also make it potentially less secure.

For starters, in a recent evaluation of LAN Manager Version 2.2, running under OS/2 Version 1.3, the National Computer Security Association found that the NOS offers a naive model of a global directory service, which is extremely pivotal to enterprise-wide security services. LAN Manager's design allows users to set up domains — groupings of servers that allow a user with a single logon to gain access to resources on all servers in the domain. While this addresses some aspects of enterprise networking, the limitations of this setup make it clumsy in large networks and add little value to network security.

Microsoft has also served up two models of security, and one of them, share-level security, is inappropriate for use in enterprise nets. Share-level security is only suitable for sites that aren't concerned with rigorous controls as it relies on fairly well-known passwords to access server resources. This model is best suited for small departments that are possibly migrating from peer-to-peer nets and where users are unwilling to invest significant time in extensive security. In a large installation, share-level security would be too loose a policy to ensure adequate control.

Microsoft has also defined security services that apply to users actually working on the server, although it claims this is not desirable.

An additional issue is that LAN Manager, similar to all network server operating

While LAN Manager 2.2 offers security services, the design lacks the functionality needed for enterprise nets.

systems, is complex. There's a steep learning curve, which is to be expected when looking for sophisticated services. But with LAN Manager, if users go beyond the standard configuration, there's a tremendous number of parameters that need to be set manually that are poorly explained.

Combine that with manuals that repeat some information over and over again while leaving terms out of glossaries and indexes, and you having a learning curve that is steeper than needed.

With Windows NT on the horizon and Microsoft's upgrade to LAN Manager — Windows NT Advanced Server — due close behind, it's unlikely that Microsoft will be spending a lot of time fixing the current weaknesses in LAN Manager.

CONTROL BASICS

Despite some major installations and some very enthusiastic reviews, LAN Manager remains an "also ran" in the network market. The current release of LAN Manager is built on top of OS/2, which is not a big favorite around Microsoft. The next major release is an enhanced version called Windows NT Advanced Server, which runs under Windows NT, and Microsoft will be doing everything it can to persuade current users to migrate to the new system.

On the plus side for the current LAN Manager is its clean integration with Microsoft's desktop operating systems — MS-DOS, Windows and Windows NT. There is also support for integration with Windows for Workgroups and for interoperation with OEM versions such as LAN Manager for

SCO Systems from The Santa Cruz Operation, Inc. based in Santa Cruz, Calif., which supports LAN Manager services under Unix.

LAN Manager supports all the basic user logon controls that might be expected. User names can be as long as 20 characters and passwords as many as 14 characters. For each server, the administrator can set a minimum length for passwords, a minimum time before a password can be changed and maximum time at which it must be changed, and prevention of reusing up to eight previous passwords.

When administration is being per-

On the plus side for the current LAN Manager is its clean integration with Microsoft's desktop operating systems.

formed remotely from the server, Microsoft advises that the work be done at an OS/2 or Windows workstation. The reason is that on other platforms, passwords are transmitted from the workstation to the LAN Manager file server unencrypted — a very strange omission. When users change their own passwords at an MS-DOS workstation, the passwords will be encrypted only if an optional service called Encrypt is installed by default and running on the clients.

What this means is that users and net administrators have to make choices about whether to use encryption. It is also strange that Microsoft has omitted encryption for a

net manager doing remote administration.

On the plus side, user accounts can be limited to which days of the week and times they can use servers. Depending on the server's configuration, user connections can be terminated or new logons prevented if the day and time restrictions are exceeded. User accounts can also be set to have an expiration date and servers can be set to lock-out accounts after a specific number of failed logon attempts. These are basic services that Microsoft has implemented soundly within LAN Manager and that are fundamental to any serious network security system.

ACCOUNT CONTROLS

By default, two named accounts are created on each server — admin and guest. Users are also granted separate accounts. The admin account is initialized with the prompt "Enter password" and needs to be reset on configuration to prevent a backdoor from existing. The guest account is created without a password and is intended to allow users that don't have accounts on the server to use public resources such as printers.

For example, if the user "keihan" was to attempt to log on to a server or domain where there was no account defined for him, the server would automatically log him in as the user "guest" and inform the user as such. The user would then be allowed all permissions the guest account is allocated. For instance, this might limit the user to access read-only documents in a particular subdirectory and use a printer attached to the server.

The guest account can be removed or renamed and can also be password-protected. In fact, password protecting the guest account is highly recommended unless the guest account is very restricted in what permissions it has to resources.

There are three privilege levels that can be assigned to user accounts on a server —

Continued on page 99

Continued from page 98

administrative, user or guest. The administrative level allows the user to start and stop services, create and modify user accounts, and perform other systems management functions. This privilege also allows the user to override any access restrictions on any resource. On any server, more than one user can own administrative-level privileges.

User level is the default for all new accounts. This allows specific controls to be applied to the access of each user-level account. A user-level account can use network resources, view resource information, and send and receive messages.

There are also four operator privileges that a user-level account can be assigned. These are server privilege, which allows the user to start and stop services and perform other server management functions; accounts privilege, which permits a user to modify user accounts on that server; print privilege, which enables the user to manage printer queues; and comm privilege, to manage communications services.

The last privilege level is guest level. The only difference between user level and guest level is that guest-level accounts can't be assigned operator privileges.

To assign privileges to collections of users, groups can be defined. Three groups exist by default — admins, users and guests. All user-level accounts are automatically assigned to the users group and all guest-level accounts to guests. All accounts with administrative privilege are assigned to the admins group. Each user can belong to as many as 256 groups, and an unlimited number of groups can be defined for each server.

RESOURCE SECURITY

Resources under LAN Manager include printers, directories, files, communications devices and administrative services. Two other specialized resources are also available — Named Pipes for interprocess communications and the ability to run a program on the file server. Access to all these resources can be controlled using LAN Manager's privilege system.

The resource to execute a program on a LAN Manager file server is accessed by a program called Netrun. This is a particularly dangerous service because although it can be restricted to who can use it and can be restricted to only certain programs in specific subdirectories on the server, the opportunities for misuse are simply too great for comfort. For example, a user might be able to run an unsafe program from a theoretically safe one and consequently breach security or crash the server. Another danger is that general-purpose applications can be extended through macros to perform completely new functions or can change data on the server without the kind of controls that a real systems application should have.

Doug DeSantis, Microsoft's product manager for LAN Manager, points out that most programs can't be executed on the server by using Netrun and "only OS/2 command line applications that use STDOUT will work successfully." While this limits what software can cause problems, it doesn't eliminate the problem itself.

Resources are identified by sharenames — names of as many as 12 characters assigned to the resource. Each resource can have multiple

sharenames for different purposes. For example, a subdirectory containing template legal clauses for contracts might be called "contracts" for the legal department and "stdtext" for the contracts department.

LAN Manager supports two models of resource security — share level and user level — to control and limit user access to net resources. Servers can only use one type at a time, but you can change an existing server from one to the other as required.

LAN Manager's least sophisticated security model, share-level security, is based on defining access permissions and passwords for shared resources. Passwords can consist of as many as eight characters and applies to the sharename, not the resource itself. The access permissions define what can be done with the resource identified by the sharename. Several sharenames can be assigned to the same resource with different passwords, each giving users different levels of access.

Share level is a weak security system because many users have the same password for the same resource resulting in more opportunities for disclosure. This might only be appropriate for a server that holds generic resources to be used by entire companies, such as template documents or printers intended for general use. Even then, it seems like an expensive choice to use a complete LAN Manager system for such limited functions.

The alternative — user-level security — is much finer grained. Rather than define access to a service by generic passwords, administrators define access to specific resources for each user. In other words, the user must provide a unique password to gain system access, rather than having different shared passwords for various services.

Rather than define permissions for each resource sharename, users are given permissions to sharenames either individually or through their membership in groups. This means user access to a server or group of servers is validated through an account name and its associated and (it is hoped) unique password. Control is also much more exact as specific users' and groups' permissions can be changed on a single basis.

PERMISSIONS GRANTED

There are seven permissions that can be assigned to resources: read, write, create, delete, execute, change attributes and change permissions. There are also three permissions that apply only to printers and communication resources: yes, which allows access; no, which denies access; and Y+P, which allows access and permits the user to change operator permissions. All seven permissions can be set for resources on servers employing user-level security, and all but "change permissions" can be set for resources on servers running share-level security.

One systems management problem is that execute permission (which prevents clients from doing anything but run applications in a server directory) can only be enforced for clients running MS-DOS Version 5.0 or OS/2. For all other systems (pre-MS-DOS Version 5.0, Windows and Macintosh), the target application won't be executable and read permission (which allows copying) will have to be used. In general, execute permission is not a particularly strong safeguard and can usually be circumvented without a tremendous degree of expertise.

Another interesting twist is that users get all permissions for a resource from all groups they belong to. So if a user has, for example, read and write permission from one group and write and create permission from another group for a specific resource, that user gets the total of both groups — read, write and create. If, however, the user has been assigned explicit permissions for that resource, they only get that assignment. To put it another way, individual permission assignment overrides group assignment. This presents a serious problem for large servers, where many groups of users are defined.

There are also some complexities to LAN

Manager that are related to

whether the standard file system — called the File Allocation Table (FAT) system — or the OS/2 High Performance File System (HPFS) are used for disk partitions. For example, if the FAT system is used, new subdirectories have no permissions assigned; but new directories under HPFS inherit the permissions of the parent subdirectory. This kind of detail could cause problems for the unwary. Microsoft says HPFS is the recommended file system and FAT is a weak alternative.

One systems management problem is that execute permission can only be enforced for clients running MS-DOS Version 5.0 or greater or OS/2.

plify user access, management and security. Microsoft suggests that user access is simplified because users can only see servers in their current domain; but, in reality, this is not a rigid control as servers in other domains can be easily listed when looking for resources.

Management is only simplified when servers are running the Netlogon service. Netlogon replicates user account data between cooperating servers in a domain.

There are three roles for a cooperating server in a Netlogon service: primary domain controller, backup domain controller or member server. All user account changes are made on the primary domain controller and replicated to the other servers in the domain running Netlogon.

If the primary domain controller fails, user logons can be validated by the backup domain controllers. Member domain controllers hold copies of the user account database but don't validate user logons. This scheme is fine for small organizations, but the fact that there are no links between domains — domains are effectively isolated from each other — means that management is only simplified if users are restricted to single domains.

WHAT IT ALL MEANS

With Windows NT on the horizon and its upgrade to LAN Manager called Windows NT Advanced Server due close behind, its unlikely Microsoft will be spending a lot of time fixing the current weaknesses in LAN Manager.

Microsoft's DeSantis claims that the fix to LAN Manager is, if fact, Windows NT Advanced Server. He also says that the upgrade to Windows NT Advanced Server and Windows NT will be simplified by a utility that will handle the process.

The beta releases of Windows NT Advanced Server look very promising and certainly fix many of LAN Manager's problems. Whichever way you look at it, however, it's hard to see that a complete change of operating systems and LAN services that require a significant investment of time and manpower constitute an "upgrade."

For small installations, LAN Manager using the user-level access control offers a secure environment with adequate, if overly complex, management. For any LAN Manager-based network that requires sound security, share-level control is best avoided. The domain system is clumsy and provides little more than a simple way of conceptually (rather than practically) subdividing the net system.

The verdict? LAN Manager Version 2.2 security and related services are adequate but complex to manage. The various weaknesses and eccentricities are surprising for such an important product for Microsoft. Windows NT Advanced Server is the strategic path for LAN Manager sites to plan to follow.

♦ Gibbs is a writer and consultant based in Ventura, Calif. He is also a technology analyst with the National Computer Security Association at (800) 488-4595. He can be contacted at (805) 647-2307, through CompuServe (75600,1002), Novell's nHub (mgibbs@gyre) or on the Internet (mgibbs@rain.org) or mgibbs@cix.compuLink.co.uk).

His book *The Absolute Beginner's Guide to Networking* (Sams Publishing) is now available, and *Navigating the Internet* (Sams Publishing) is due for release this month.

LIMITED DOMAINS

LAN Manager's security services are only as good as their availability across the net. Within a work group, administrators can set up domains, which are Microsoft's way of organizing servers and workstations on internets into groupings for administrative purposes.

For example, if there were two servers in the accounts department and three in production, an administrator might set them up to occupy two separate domains called, say, Beans and Work. When a user logs on, they can select which domain to use, for example Beans. After this point, users see only the servers in the Beans domain when they ask for a list of servers, although servers in other domains can be accessed when needed.

The theory is that these groupings will sim-

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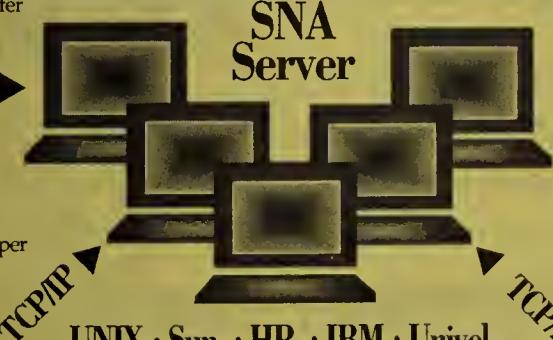
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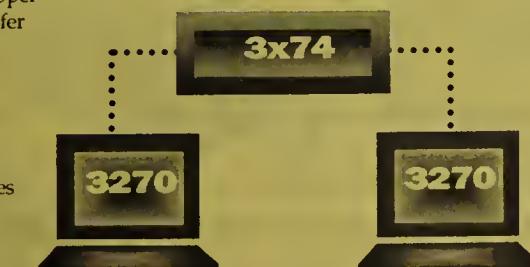
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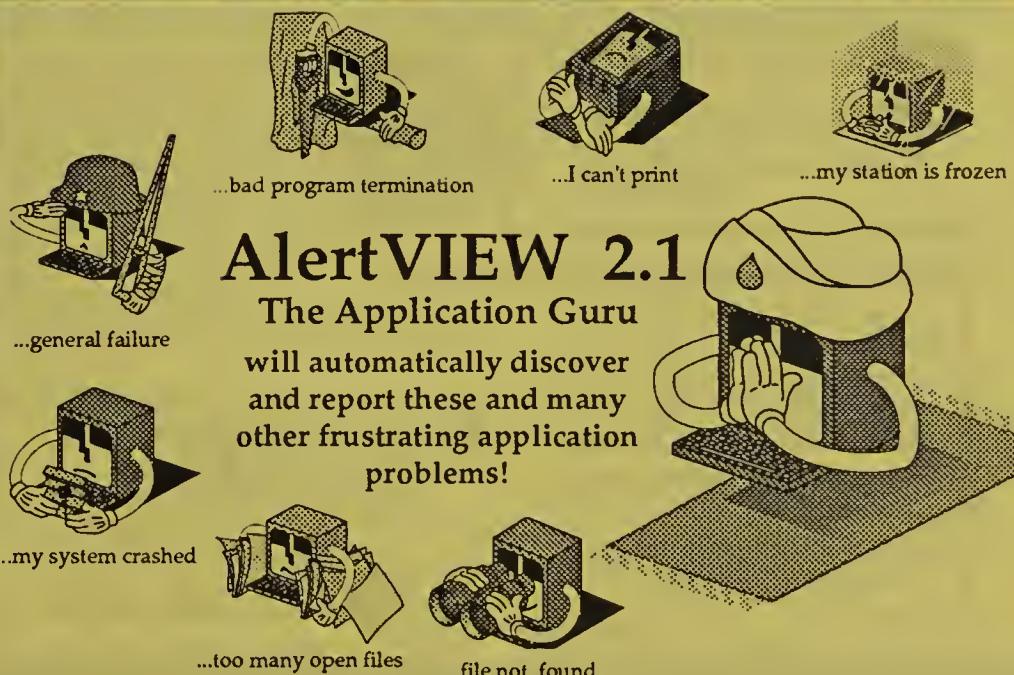
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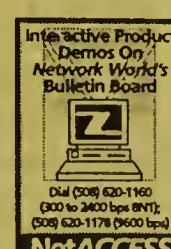
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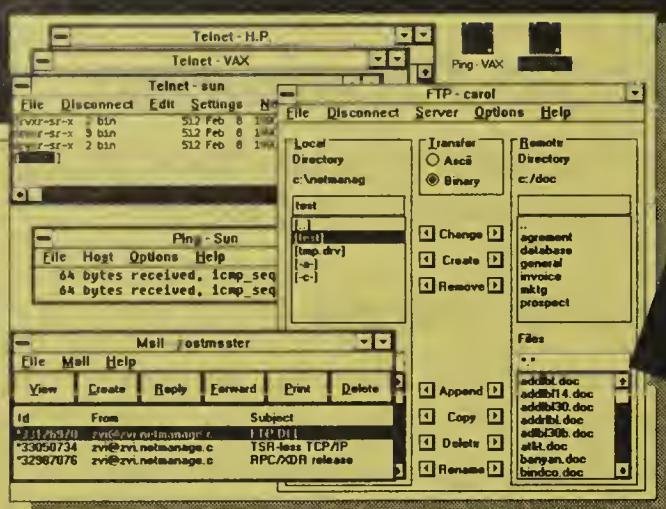
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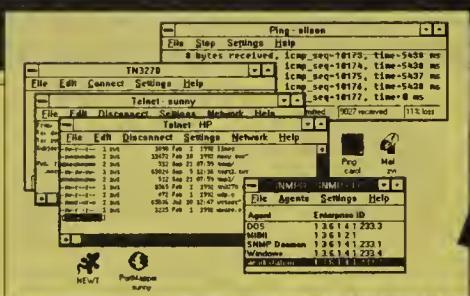
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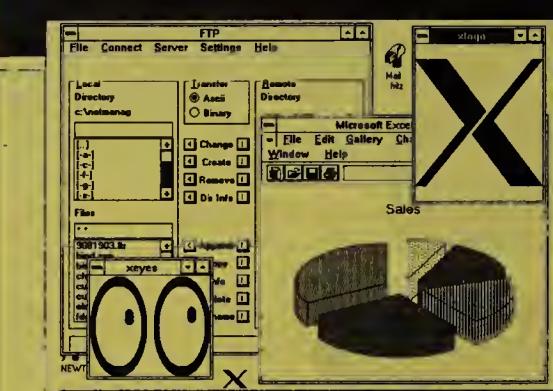
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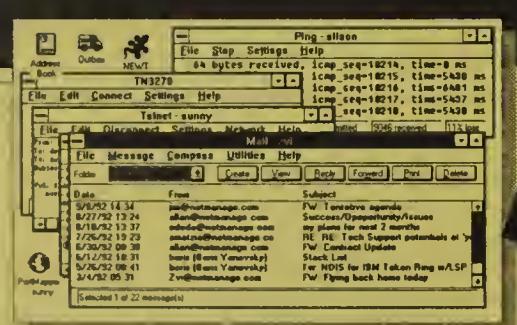
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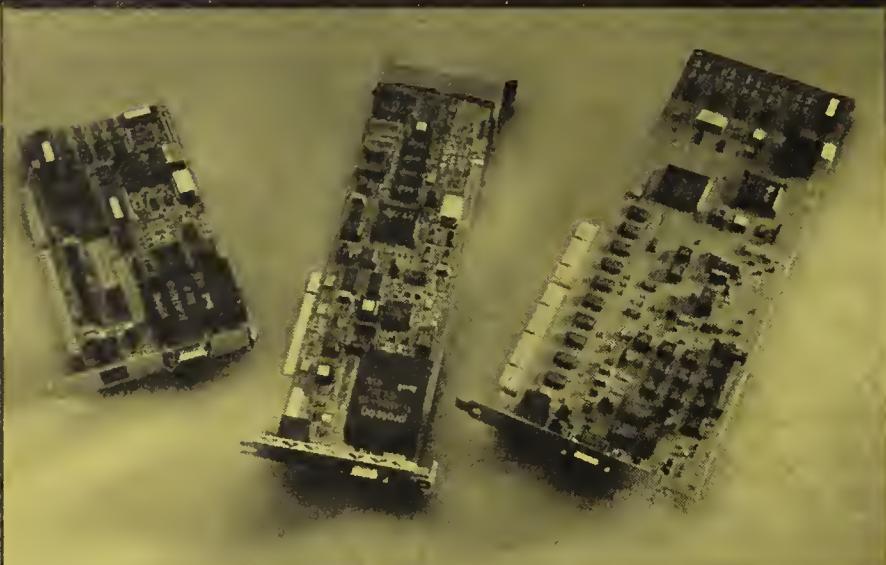
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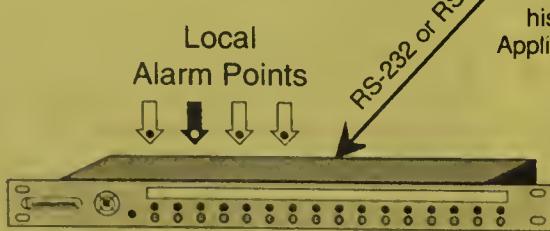
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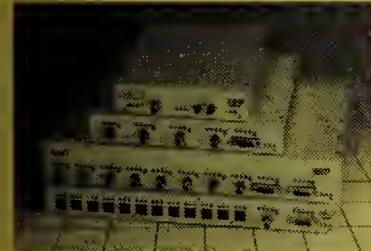
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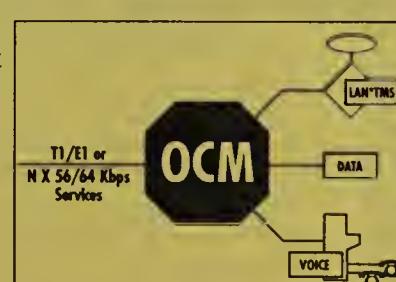
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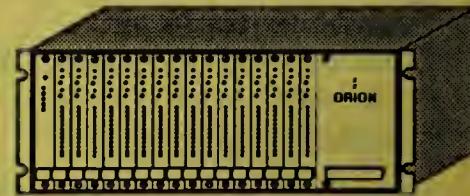


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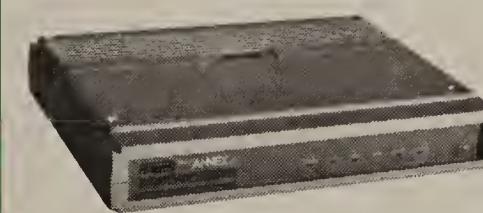
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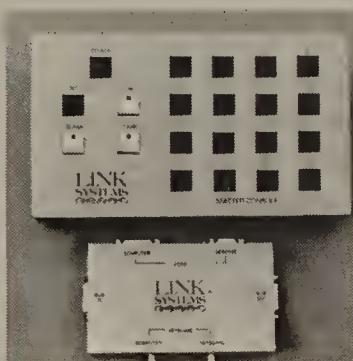
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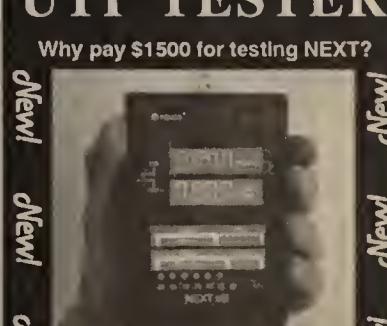
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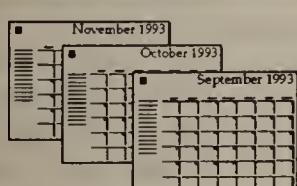
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Page 46



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GOSIP

Continued from page 1

There is also the reality that although the department's multiprotocol Energy Sciences Network supports OSI, there is little demand for OSI routing since most of the Internet, widely used by government agencies, is TCP/IP-based.

But the nine-member panel, to be chaired by NIST, will not convene with any foregone conclusions, Aiken emphasized. Complex issues such as the role of dual-protocol stacks and TCP/IP's current address limitation will be part of the review.

Whatever the outcome of the government panel decision, the Energy Department would like to see both TCP/IP and OSI grow to adopt a common Layer 3 connectionless routing format. The Department of Defense has already begun an internal evaluation of GOSIP's cost and technical strengths.

Mike Corrigan, assistant commissioner for telecommunications services at the General Services Administration (GSA), said meeting GOSIP requirements has not been much of a problem at GSA. But taking a close look at GOSIP was nonetheless a good idea. "You have lots of TCP/IP software but much less OSI software out there," he noted.

For NIST, the review could not come at a worse time. Last year, NIST joined with two major nongovernment OSI user groups and the Canadian government to declare that GOSIP Version 3 would dovetail with a collaborative document, the Industry and Gov-



ernment Open Systems Specification (IGOSS).

IGOSS is supported by the Electric Power Research Institute and the Manufacturing Automation Protocol/Technical and Office Automation Protocol user group, which includes such large users as General Motors Corp. and The Boeing Co.

NIST's Nakassis insisted that no final decision on releasing GOSIP Version 3 has been made. But he agreed there is the strong possibility that NIST will not go forward with Version 3 until the panel completes its review, which could be well into 1994.

"Clearly, there is a [connection] between what the panel is doing and what we are doing with IGOSS and GOSIP," Nakassis said.

"The reason we're convening the panel is we're the representative of the other government agencies and we need to find out their view of the future," he said. If the panel backs the government's OSI policy, then NIST will stay on the course it set in 1990.

But if either technical or nontechnical considerations lead to a decision to incorporate TCP/IP — or any other protocol — into the government's data networking standards, then NIST may do so.

"We have an allegiance to the U.S. government and the American people," Nakassis said. "And if it turns out that interest is best served with a different policy, then we assume it will have to be served through a different policy."

Ultimately, the government's data networking policy decision may be kicked upstairs to the Department of Commerce. Secretary of Commerce Ron Brown may end up making the final decision. □

Databases

Continued from page 1

HP is working with some of its OpenView application developers, such as ISI-CAD, Inc., Ki Research, Inc. and Peregrine Systems, Inc., to define its interface, which will conform to the SQL Access Group's (SAG) CLI specification. SAG is a consortium of vendors looking to foster interoperability between multivendor SQL databases.

CLI is an API that enables developers to link applications to SQL databases.

Sun declined to say what companies it is working with and whether its interface will comply with SAG specifications.

The interfaces will essentially allow users to group multivendor databases into a common logical repository of management data for all management systems in a network, accessible by applications as if they were one database.

The APIs will allow users to purchase or deploy the databases of their choice for storing OpenView and SunNet Manager data.

Currently, OpenView comes packaged with an Ingres database, while SunNet Manager includes a proprietary, Sun-developed database.

"Customers are asking that their management data be stored in the databases that they've invested a lot of energy in and are standardizing on in their organizations," said Trisha Johnson, HP product manager for platform products. "This way, customers can use their own database engine, and the management application would use this database-independent layer to take away the idiosyncrasies of each of the database engines available in the marketplace."

Management applications will use the data to display statistics on network events, propagate trap information, manipulate the performance of a network device and reroute traffic. Such data could include the Management Information Bases (MIB) of

the managed network devices.

SQL defines a common language for storing and accessing data, but database vendors can implement it in different ways. These implementations can take on proprietary properties, threatening to lock users into one vendor's database offerings.

"The database vendors all have different ways of getting information into the database and different [interfaces] to get it out," said Scott Safe, HP's OpenView program manager. "So there is no commonality between all those database vendors, and that is a huge problem."

The HP and Sun interfaces are designed to sidestep vendor-specific implementations of SQL, which can be especially troublesome if databases for management applications, enterprise and element management all come from different vendors.

Analysts said the HP and Sun interfaces will make it easier to access management data, but vendors need to address data synchronization, or the coordination of database processes in multiple domains.

"If they can hide calls from the user, that's not bad," said John McConnell, vice president of Infonetics Research, Inc. in Boulder, Colo. "But there are some synchronization issues when you have multiple locations and multiple platforms. How do you keep them synchronized so they can update each other when something changes?"

Users are anxious for the interfaces. "We want to be able to create a complex of management information [using a logical

repository of distributed databases," said Dror Segal, director of network management and new technologies at Securities Industry Automation Corp. in New York. Segal said he believes the interfaces will help the company do that.

HP's interface will debut in a new release of OpenView, scheduled for mid-1994, HP's Johnson said.

Sun hopes to unveil its API before that, said Steve Borcich, product development manager for SunNet Manager.

Sun's interface will work much in the same manner as HP's in that it will allow users to select the database of their choice for logging SunNet Manager data. But it is also designed to let users augment SunNet Manager's prepackaged data repository by adding databases of their preference and storing SunNet Manager information on more than one database.

"Some big customer might require Sybase, another would require Ingres and another would require Oracle," Borcich said. "You wouldn't want to ship a product that tries to utilize those as stand-alone offerings. I'd have a nightmare from an installation and administration perspective."

Should a user expand on Sun's repository with another database, the interface will ensure that SunNet Manager applications will be able to retrieve data from the new database without modification, he added. □

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Loral

Continued from page 1

nen, software engineer for integrated network management research and development at Loral's Western Development Labs.

Loral uses Nynex Allink Co.'s Allink as the manager of managers for its corporate Systems Network Architecture net, which links 13 sites countrywide. The element managers sending alerts and alarms to the Allink system include IBM's NetView, Sun Microsystems, Inc.'s SunNet Manager, Newbridge Networks, Inc.'s 4602 MainStreet Intelligent Network-Station, ISICAD, Inc.'s Command 5000 and Remedy Corp.'s Action Request trouble-ticketing system.

If, for example, one of the seven Newbridge multiplexers in Loral's backbone generates an alarm, a script file in the Remedy Action Request System will automatically generate a trouble ticket and populate it with data on the mux from an Ingres database.

When the trouble ticket is forwarded to the Allink console, the net manager can click on a mouse to bring up a window showing all the errors on the lines going through the mux. There, the manager can isolate the fault to one or more of the mux's net interface cards.

But before dispatching a technician, the manager might want to peruse some of the recommended actions Allink displays when specific alarms are generated.

These recommended actions are predefined by network managers when they install Allink.

If one of the recommended actions is to regroom the circuit, the manager can click the mouse to kick off another script file that will send a command to the Newbridge 4602 element manager to reset the parameters of the circuit.

If the alarm comes from one of the 34 Cisco Sys-



Satellite

Continued from page 1

bit/sec, the Synchronous Optical Network (SONET) Optical Carrier-12 rate.

Participating organizations will begin testing ACTS this October in applications that range from data processing to disaster recovery and medical imaging.

Current Ku-band satellites operating in the 8-GHz to 12-GHz range simply blanket a large landmass in a transmission swath called a "footprint."

But this satellite, operating in the 20-GHz to 30-GHz range, will also be able to direct "spotbeams" 200 miles or less in diameter to anywhere in the U.S. within microseconds for dynamic response to traffic and net changes.

By "hopping spotbeams" from one site to another, users can transmit voice, data and images to specific points without relying on satellite hubs, according to Mike Smith, ACTS experiment program manager at NASA.

"This routing function is normally done on a hub on the ground, he said. "You don't have to have hubs in theory, with this satellite." This could save costs.

NASA said the new bird will also support deployment of bandwidth-on-demand services so organizations will not have to lease blocks of satellite time an-

tems, Inc. routers in Loral's network, it will be forwarded to Allink from SunNet Manager, which governs the company's router internet. Again, the alarm will induce Remedy's Action Request System to log a trouble ticket and forward it to the Allink console.

Next, the network manager may scan the devices that are physically connected to the router and the surrounding cable arrangement. To do this, the manager clicks on the icon that represents the Cisco router and then chooses the "circuit trace" command, triggering a script file that opens a window into ISICAD's Command 5000 system. This shows the cable layout of the entire building in which the router is situated.

The script files even allow Loral to replicate the databases of its various management systems, Kuhnen said. For instance, scripts have been built to automatically update Allink's database when information on network objects and their connections are added or deleted from ISICAD's database, Kuhnen said.

"Allink can display a certain amount of detail about how things are connected, and the ISICAD product can actually display much more information," he said. "So general information about how things are connected and arranged hierarchically are stored in the Allink database and then more detail is added in the ISICAD database."

Loral's lone customer, meanwhile, is using Loral-developed script files to link Allink, NetView, IBM's LAN Network Manager management system, SunNet Manager, Hewlett-Packard Co.'s OpenView and a slew of modem, multiplexer, data service unit, bridge, hub and private branch exchange element managers into a single interactive system.

They have also programmed some 300 expert system rules into the Allink system to correlate alarms and automatically kick off script files, Kuhnen said.

Pricing for the Loral management integration service was not available. □

will be able to cope with "rain fade," when poor weather conditions deteriorate the satellite signal.

NASA has set up a timetable for a wide range of experiments over a two-year cycle.

Huntington National Bank, with 385 offices in 17 states, will be among the first commercial users to test ACTS. The bank will install a Ka-band dish in the bank's Parma, Ohio, data center and another in its Columbus, Ohio, office to evaluate a disaster recovery service for the bank's check cashing facility.

The bank wants "to see how quickly, efficiently and economically we can bypass [our] terrestrial T-1 network using a space link," said Don Flournoy, professor of telecommunications and director of the Institute for Telecommunications Studies at Ohio University. Ohio University, Sungard Recovery Services, Inc., Unisys Corp. and Ascom Timeplex, Inc. are providing technical assistance for the bank's experiment.

American Express will use ACTS as a data channel between Phoenix and Mexico City, Mexico, and compare ACTS Ka-band T-1 link with its Ku-band system.

Southern California Edison Co. wants to see if the small Ka-band USATs supported by ACTS can provide a low-cost alternative to the land lines in its supervisory control and data acquisition network used to monitor and control its power grid.

And the Army has several experiments planned, including videoconferencing, transfer of geographic and logistics information, medical databases and mobile communications. Although ACTS can support near-gigabit speeds, NASA primarily is interested in finding out whether ACTS can dovetail with the fiber-based SONET speeds of up to 622M bit/sec.

ACTS, if successful, will put the U.S. in the lead for Ka-band satellite services. While the European Space Agency launched a Ka-band satellite in 1989 and Italy launched ITALSAT in 1991, neither of those provide on-board processing, Smith said.

But he pointed out that the Japanese are planning to launch the Engineering Test Satellite in 1995, putting another powerful Ka-band bird in the sky. □

Billing

Continued from page 1

As one user put it, "I'm satisfied with my billing and reporting. I have other things to worry about now."

Data for the telephone survey was collected earlier this month by Focus Data, Inc., a Framingham, Mass.-based market research firm. The results will be part of a TeleChoice report on billing and reporting trends due out this week.

Almost half of the readers that were surveyed are responsible for more than \$500,000 in annual telecommunications services expenditures at their firm, with more than 61% spending an excess of \$250,000 a year.

Of the 100 users questioned, 92% claimed decision-making responsibility for private-line services, 72% for 800 services, 54% for public data services and 52% for virtual network services.

Service support, network performance and price were listed as the top three factors in choosing a service provider, with billing and reporting ranking fourth (see Figure 1, this page). Network management capabilities and service features followed.

Despite the progress made by carriers in fixing billing woes, users said there is room for improvement. The survey indicates that despite its moderate ranking, billing and reporting garners the lowest satisfaction score of the six major buying criteria.

MCI Telecommunications Corp. users appear to be the most content with their provider. MCI achieved the highest end-user satisfaction scores in the areas associated with selecting a primary carrier and evaluating billing and reporting options.

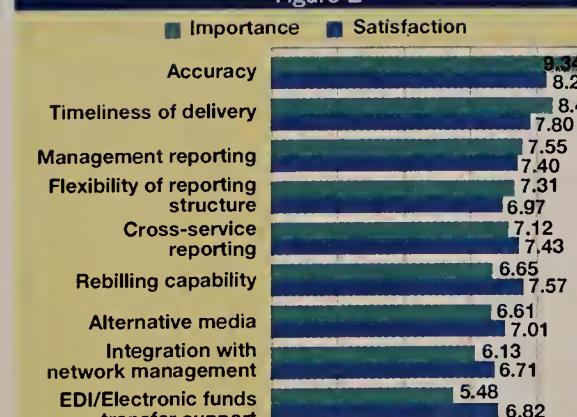
MCI's mean rating for billing accuracy was 8.64 on a scale of one to 10, the highest score in the study for end-user satisfaction.

Perhaps some of the biggest gains are being made by the local telephone companies, where billing satisfaction scores mirrored their interexchange carrier counterparts. Ratings for service support, network performance and price were considerably less than long-distance carrier scores, however, indicating that work still remains to be done in those areas.

When comparing billing capabilities of

Users grade carriers on billing

Figure 2

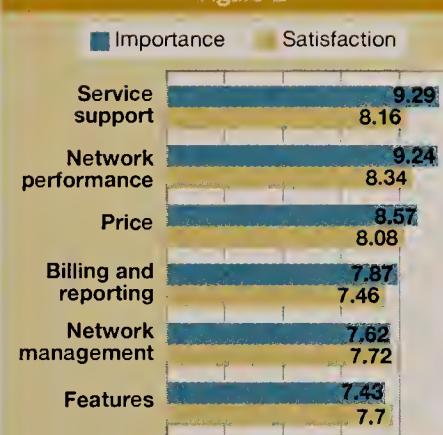


Network World asked 100 readers to rate the importance of these billing issues with their primary carrier during the past 12 months in each of these areas. Answers are based on a scale of 1 to 10, with 10 being the best rating.

GRAPHIC BY SUSAN SLATER

Users rate primary providers

Figure 1



Network World asked 100 readers to rate the importance of these issues when choosing a carrier and their level of satisfaction in each area with their primary carrier. Answers are based on a scale of 1 to 10, with 10 being the best rating.

SOURCE: TELECHOICE, INC., VERONA, N.J.
GRAPHIC BY SUSAN SLATER

carriers, readers said accuracy and timeliness of delivery are their top two concerns (see Figure 2, this page).

All of the readers surveyed said they believe that accuracy was extremely high in billing, a marked switch from years past when users were jumping ship due to billing errors (NW, Dec. 25, 1989, page 1).

"Just keep emphasizing accuracy and ease of interfacing with the information," said one user when asked what advice he would give to his carrier to improve billing systems.

Private-line managers are most satisfied with the timeliness of their billing and reporting, while public data network users were the least satisfied in this area.

Advanced billing features such as electronic data interchange/electronic funds transfer and ties to net management systems from billing applications are still situated relatively low on end-user priority lists.

Managers of 800 service are concerned about cross-service billing and reporting capabilities, seemingly indicative of the lack of reporting capabilities and combined billing for both inbound and outbound traffic, capabilities that have only recently been launched by the major carriers.

Across the board, managers of virtual networks held billing and reporting as more critical than did managers of 800 service, private-line or public data networks.

Virtual net users find that management reporting, rebilling capability, availability of alternative media and integration with network management are much more critical to their management of virtual network services than decision makers for other services.

More than with other services, this underscores the greater reliance on billing and reporting in virtual nets to support applications such as network analysis, cost containment and net performance monitoring.

Personal computer-based software is rapidly making a dent in the marketplace. Twenty-one per-

cent of the respondents said they are using at least one carrier-supplied PC-based reporting tool and reported rather high satisfaction with those offerings — a seven on a scale of one to 10.

The ease of use and flexibility in crafting report output has been key to widespread acceptance in the market.

However, only 10% of those using PC-based programs are replacing existing magnetic tape applications, indicative of the low to mid-range market focus of these products thus far.

New compact disc read-only memory-based systems are expected to make major inroads into the large customer base, where mainframe-based magnetic tape-driven reporting is not uncommon (NW, May 17, page 2).

End users continue to push for advanced billing and reporting functions to be included as part of standard carrier service packages.

"We are working toward EDI, but we would like to have it for little or no additional charge," said one user.

Nearly 60% of the other respondents agreed, saying they are unlikely to pay additional fees for enhanced carrier billing options.

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